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Taxonomic revision of *charon*-, *floridanum*- and *muscaeforme*-groups of *Gryon* Haliday, 1833 (Hymenoptera, Scelionidae) from Japan, with descriptions of two new species and host information

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Abstract

Japanese species of the *muscaeforme*-group, *charon*-group, and *floridanum*-group of *Gryon* have been revised. Among the species of the *muscaeforme*-group, *G. fulvicoxa* **sp. nov.** is newly described. *Gryon misha* Kozlov & Kononova, **syn. nov.** is considered a junior synonym of *G. japonicum* (Ashmead). *Gryon maruzzae* Mineo, **syn. nov.** and *G. sugonjaevi* Kozlov & Kononova, **syn. nov.** are considered junior synonyms of *G. yamagishii* Mineo. Among the species of the *charon*-group, *G. shisa* **sp. nov.** is newly described. *Gryon hakonense* (Ashmead) **syn. nov.** is considered as a junior synonym of *G. philippinense* (Ashmead). Among the species of the *floridanum*-group, *G. pennsylvanicum* (Ashmead) is recognized. Host records of the three species groups are also revised.

Keywords

Alydidae, Coreidae, egg parasitoids, natural enemy

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Introduction

Gryon Haliday, 1833 is one of the largest genera in Scelioninae with 332 species known in the world (Johnson 2019). Almost all of them are egg parasitoids of Heteroptera, mainly Pentatomidae, Reduviidae, and Coreidae (Masner 1983). In Japan, 23 species are known (Ashmead 1904; Mineo 1979; 1980a, b, 1981, 1990a, b, 1991; Kozlov and Kononova 1989; Yasuda 1990; Kononova and Fursov 2005; Kononova and Kozlov 2008) and four of them are recorded as natural enemies of pests of rice, soybeans, vegetables and fruits (Appendix 1). Some members of Scelionidae, including *Gryon*, are important natural enemies of agricultural pests. The life history of *G. japonicum* was partially provided by Noda (1993), however, life cycles of other species are almost unknown. Owing to the potential of *Gryon* as biocontrol agents, some biological and ecological studies have also been conducted (Noda 1993; Dasilao and Arakawa 2004, 2005; Nakajima and Fujisaki 2010; Nakajima et al. 2012).

Gryon is divided into 22 species groups based on morphological characters such as the sculpture of the frons and occiput, and the ratios of fore wing vein lengths (Masner 1975, 1979, 1983; Mineo 1980b, 1981, 1983a, b, 1990b, 1991; Mineo and Caleca 1987b). Among Palearctic and Oriental regions, six species groups (*charon*, *insulare*, *misellum*, *muscaeforme*, *myrmecophilum* and *pubescens*) are known from both regions, two groups (*hungricum* and *subfasciatum*) are known only from the Palearctic region and two groups (*floridanum* and *leptocorisae*) are known only from the Oriental region (Masner 1975, 1983; Mineo 1980b, 1981, 1983a, 1991). Among Japanese species, seven species groups have been recognized (Appendix 1).

In the present study, we taxonomically revised three species groups (*muscaeforme*-group, *charon*-group, and *floridanum*-group) of Japanese *Gryon*, which include important natural enemies of pests. We examined not only field-collected specimens but also voucher specimens of previous ecological, biological and applied studies in order to confirm identifications.

Methods

Specimens examined in the present study are deposited in collections which are abbreviated as follows: Entomological Laboratory, Kyushu University, Fukuoka, Japan (ELKU); Entomological Laboratory, Meijo University, Nagoya, Japan (**ELMU**); Ehime University Museum, Matsuyama, Japan (**EUMJ**); Institute for Agro-Environmental Sciences, National Agriculture and Food Research Organization, Tsukuba, Japan (**NIAES**); Hokkaido University Museum, Sapporo, Japan (**SEHU**); I.I. Schmalhausen Institute of Zoology, National Academy of Sciences of Ukraine, Kiev, Ukraine (**IZAN**); Zoological Institute, Russian Academy of Sciences, Saint Petersburg, Russia (**ZIN**). We also visited Institute of Ecology and Biological Resources, Hanoi, Vietnam (**IEBR**) to examine type specimens of Vietnamese species. The following abbreviations are used for the collecting methods: Malaise trap (MT) and yellow pan trap (YPT).

Photographs were taken using a Canon MP-E65 mm micro lens or an Olympus SZX10 stereomicroscope mounted on a Canon EOS 60D, combined by CombineZM, and processed in GIMP 2.8.14. SEM images were taken using a Hitachi S-3000N.

Morphological terminology and measurements follow Mineo and Villa (1982), Masner (1980), and Mikó et al. (2007, 2010). Description of surface sculpturing follows Eady (1968) and Harris (1979). Abbreviations used for measurements are as follows: head height (HH); head width (HW); head length (HL); length of interorbital space (IOS); width of antennal depression (WAD); ocular-antennal depression distance (OAD); length of posterior ocellar line (POL); length of ocular-ocellar line (OOL); lateral oceller line (LOL); maximum length of mesoscutum (ML); length of transscutal line (TSL); maximum length of mesoscutellum (SL); maximum width of mesoscutellum (SW). The ratio FCI (frontal cephalic index) is the ratio of HW/HH, the ratio LCI (lateral cephalic index) is the ratio of HH/HL, and the ratio DCI (dorsal cephalic index) is the ratio of HW/HL.

*Taxo*nomy

Gryon Haliday, 1833

Gryon muscaeforme-group Mineo, 1981

Diagnosis. Frons reticulate with setae; frontal depression weakly developed without enclosing strong carina. Clypeus almost rounded. Eyes with sparse setae or without. Occipital carina complete, angular point of occipital carina developed; postoccipital carina discontinuity present; postgena weakly costate along postoccipital carina; postgenal pit located near fossa.

Gryon fulvicoxa Komeda & Mita, sp. nov.

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Figs 1A, 2A, 3A, 4A, 5A, G, 6A

Diagnosis. Frontal depression transversely costate by strong irregular carinae. Horizontal portion of occipital carina straight, short, reaching longitudinal extension line of outer margin of lateral ocelli. Legs entirely yellow.

Description. Female. Length = 1.1–1.3 mm.

Color (Figs 1A, 2A). ***Body*** mainly dark brown-black. A2–6, forecoxa brown. A1, mandibles, and legs (including mid and hind coxae) yellow.

Head. FCI = 1.20–1.33; LCI = 1.48–1.64; DCI = 1.86–2.05; HW/IOS = 1.76–1.83; head about 1.3 times as wide as mesosoma. (HW/TSL = 1.25–1.34). Frons (Fig. 3A) reticulate with setae; central carina present ventrally; frontal depression weakly developed, transversely costate by strong irregular carinae. Vertex reticulate

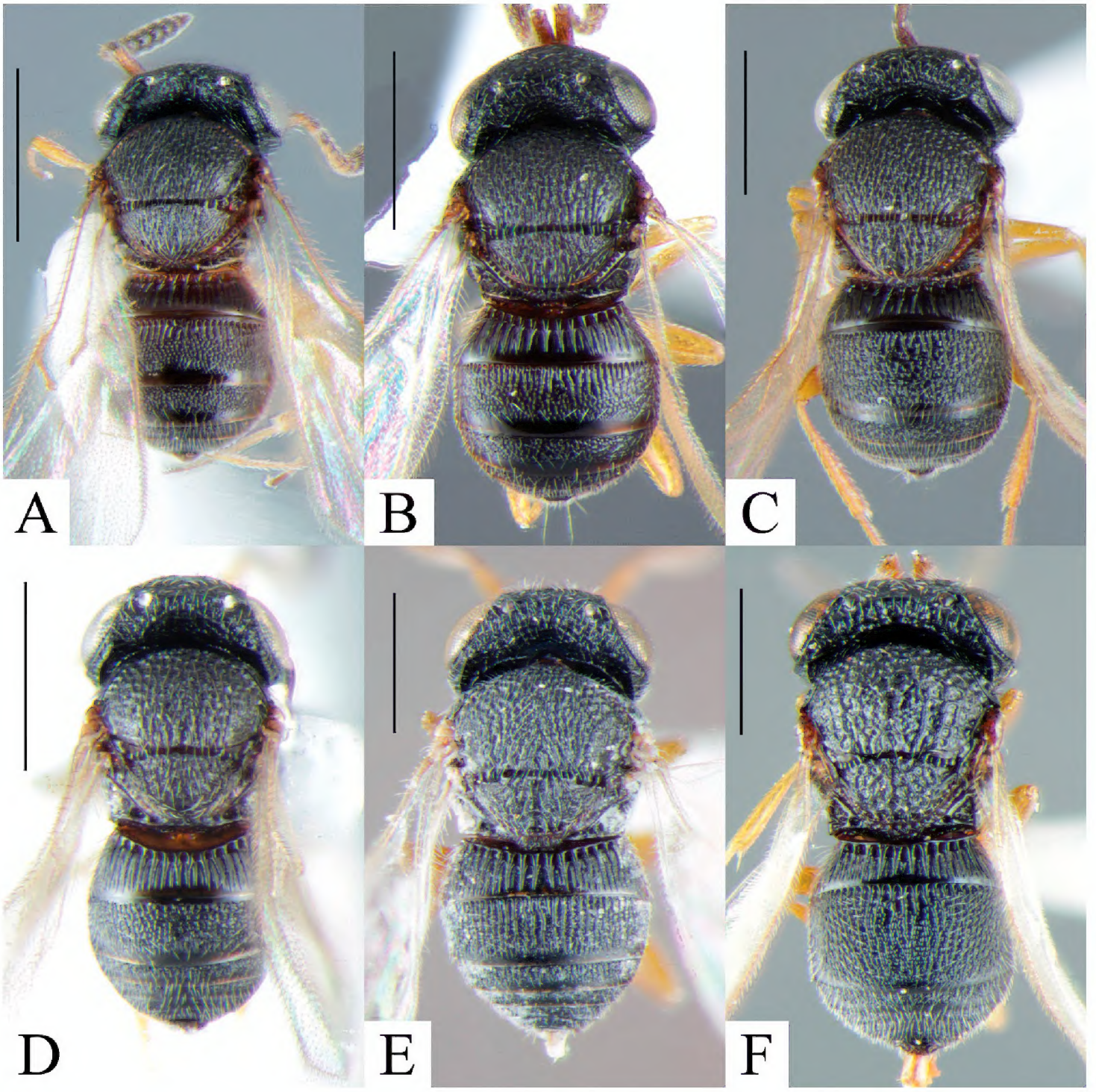

Figure 1. Japanese *Gryon* spp., dorsal view **A** *G. fulvicoxa* sp. nov., holotype **B** *G. japonicum* **C** *G. yamagishii* **D** *G. philippinense* **E** *G. shisa* sp. nov., holotype **F** *G. pennsylvanicum*. Scale bars: 1 mm.

with setae; interocellar space reticulate; hyperoccipital carina absent; POL 3.1 times as long as OOL (POL/OOL = 2.84–3.32); OOL half times as long as LOL (OOL/LOL = 0.48–0.63). Clypeus rectangular, with rounded corners. Gena coriaceous with setae; medial genal carina absent. Occiput (Fig. 4A) transversely costate with setae; occipital carina complete; angular point of occipital carina developed; horizontal portion of occipital carina straight, short, reaching longitudinal extension line of outer margin of lateral ocelli; postoccipital carina discontinuity present; postgena weakly costate along postoccipital carina; postgenal sulcus curved toward hypostoma; postgenal bridge smooth, weakly longitudinally costate beside median sulcus. Antennae (Fig. 5A) clavate; A1 about 3.2 times longer than radicle, as long as clava; clava with five segments; claval sensilla formula A8–12/2–2–2–2–1; claval length about 3.7 times longer than width. Mandible thin, tridentate, anterior tooth longer than other teeth.

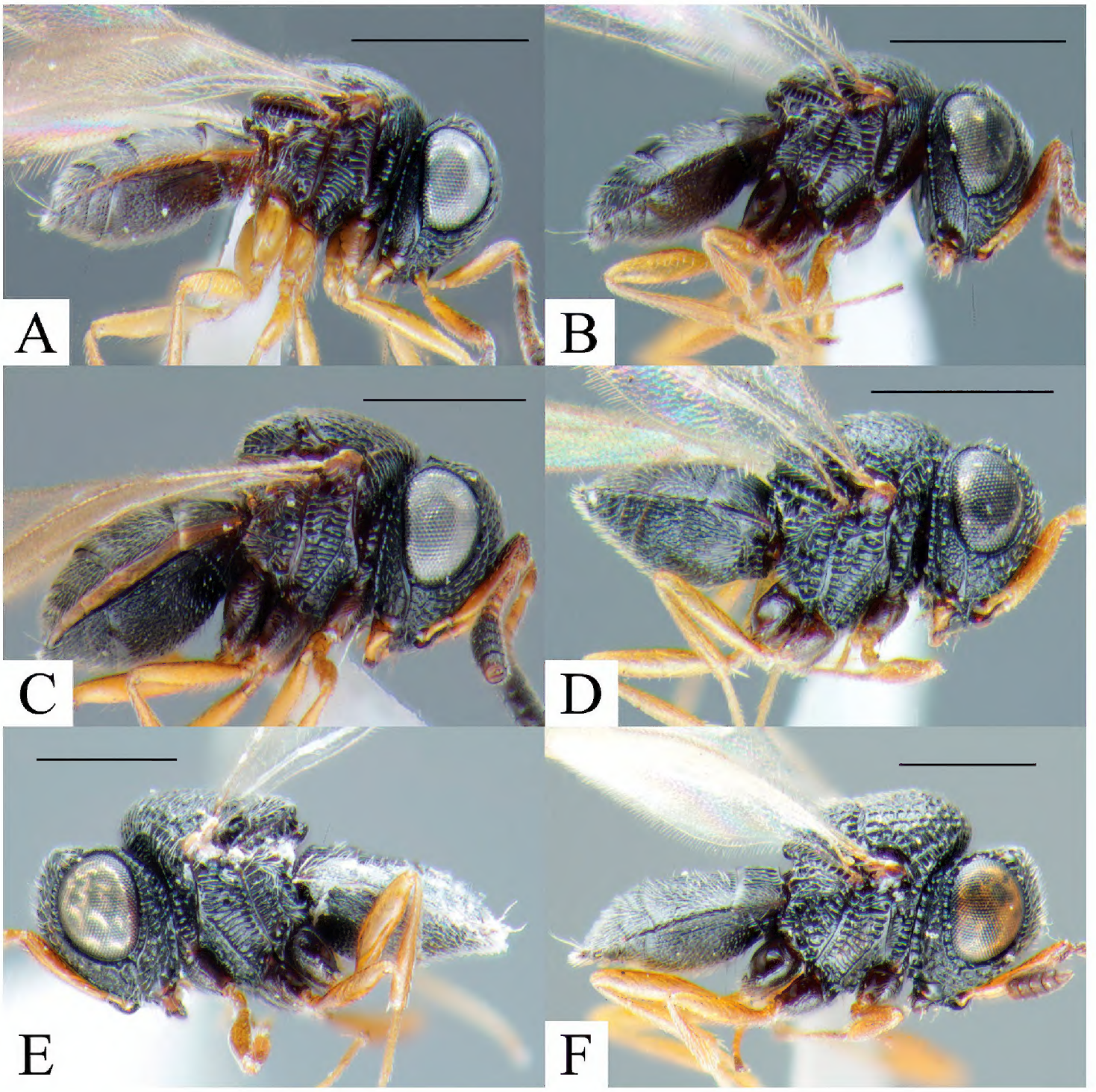

Figure 2. Japanese *Gryon* spp., lateral views **A** *G. fulvicoxa* sp. nov., holotype **B** *G. japonicum* **C** *G. yamagishii* **D** *G. philippinense* **E** *G. shisa* sp. nov., paratype **F** *G. pennsylvanicum*. Scale bars: 1 mm.

Mesosoma. Cervical pronotal area granulate with dense setae; epomial carina strongly present, not reaching dorsal edge; pronotal suprahumeral sulcus foveolate, unclear mesad; lateral pronotal area smooth with transverse sparse carinae. Propleuron smooth with imbricate sculpture. Mesoscutum about 1.4 times as wide as long (TSL/ML = 1.35–1.49), with dense setae, reticulate anteriorly, longitudinally costate posteriorly; parascutal carina absent; notaulus absent. Mesoscutellum about 2.3 times as wide as long (SW/SL = 2.10–2.43) with dense setae, longitudinally costate mesad, granulate laterad. Mesopleuron smooth with transverse dense carinae above mesopleural canina, smooth with sparse setae below mesopleural canina; prespecular and mesepisternal sulci foveolate; prespecular sulcus with setae; mesopleural carina strongly present; postacetabular sulcus foveolate. Metascutellum weakly produced, longitudinally striate. Dorsal metapleural area smooth with setae dorsad; ventral metapleural area weakly

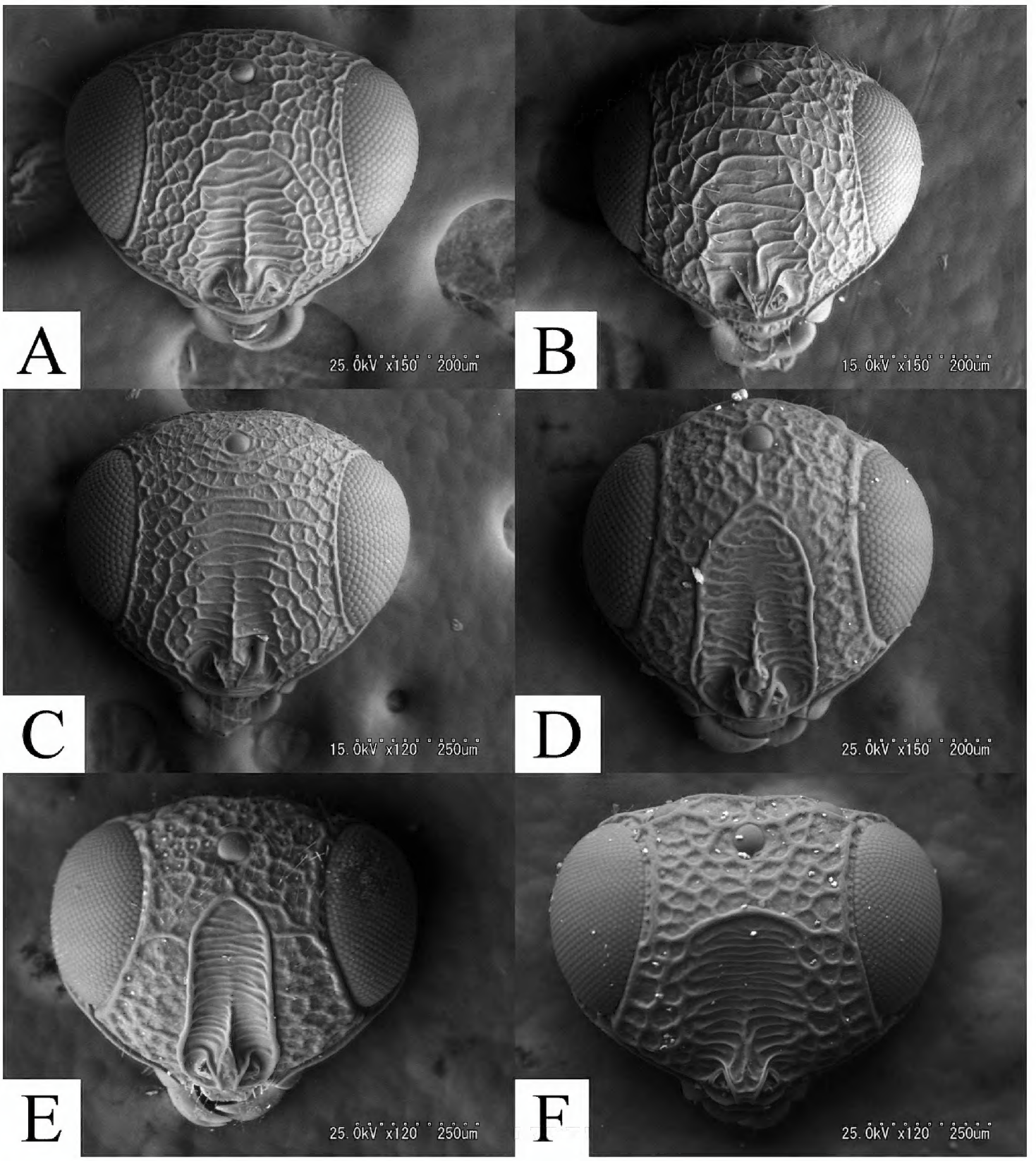

Figure 3. Frons of Japanese *Gryon* spp. **A** *G. fulvicoxa* sp. nov. **B** *G. japonicum* **C** *G. yamagishii* **D** *G. philippinense* **E** *G. shisa* sp. nov. **F** *G. pennsylvanicum.*

rugulose with setae; anterior part of metapleural sulcus and upper paracoxal sulcus with setae. Propodeum foveolate with setae. Fore wing (Fig. 7A), stigmal vein about 1.6 times longer than marginal vein; postmarginal vein about 3.5 times longer than marginal vein.

Metasoma. T1 longitudinally striate, setose laterally. S1 longitudinally striate. T2 longitudinally striate anteriorly, reticulate posteriorly, setose laterally. S2 with setae, granulate mesad, striate laterad. T3 reticulate, with setae laterad and posteriorly. S3–6 punctate with setae. T4 punctate-striate with setae. T5–6 punctate with setae.

Male. Almost same as female, but antennae (Fig. 5G) filiform; A1 yellow, A2–11 brown.

Host. Unknown.

Material examined. ***Holotype*:** Hokkaido, Sapporo city, Toyohira ward, Hitsujigaoka. 43.008°N, 141.415°E; alt. 100 m, 8–15.VI.2010, Kazuhiko Konishi leg. (MT) 1♀ [ELKU]. Paratypes. Same locality as holotype, 1–8.VI.2010, Kazuhiko Konishi leg. (MT) 1♀ [ELKU]; 8–15.VI.2010, Kazuhiko Konishi leg. (MT) 1♀ [ELKU]; 22–29.VI.2010, Kazuhiko Konishi leg. (MT) 1♀ [ELKU]; 6–13.VII.2010, Kazuhiko Konishi leg. (MT) 1♀ [ELKU]; 27.VII.–3.VIII.2010, Kazuhiko Konishi leg. (MT) 1♂ [ELKU]; 1♂1♀ [EUMJ]; Tokyo pref., Minami-Tama dist., Asakawa town, Mt. Takao-san, 19.V.1935, H. Ise leg. 1♀ [NIAES]; Nagano pref., Ueda city, Sugadaira-Kôgen, Tsukuba University, 26. VII–1.VIII.2015. So Shimizu leg. (MT) 1♀ [ELKU]; Gifu pref., Kani city, Katabira, 10–16.IV.2004, Kenzo Yamagishi leg. (MT) 1♀ [ELMU]; 26.VI.–2.VII.2004. Kenzo Yamagishi leg., 1♀ [ELMU]; 24–30.VII.2004. Kenzo Yamagishi leg., 2♀ [ELMU]; Tottori pref., Saihaku dist., Daisen town, Mt. Daisen, 25.VIII.1970. 1♂1♀ [ELKU]; Fukuoka pref., Fukuoka city, Sawara ward, Mt. Sefuri-san, 1.VIII.1992, Yoshimitsu Higashiura leg. 1♀ [ELKU]; Tagawa dist., Soeda town, Mt. Hiko-san. 12.IX.1968, (MT) 1♀ [ELKU]; 11.VII.1969. Kenkichi Kanmiya leg. 3♂3♀ [ELKU]; 12–19.V.2008, Toshiharu Mita and Sinsuke Sato leg. (MT) 1♀ [ELKU]; Kumamoto pref., Yatsushiro dist., Izumi vill., Shiratori rindô, 9.VIII.1992. 1♂ [ELKU].

Distribution. Japan (Hokkaido; Honshu: Tokyo, Nagano, Gifu, and Tottori; Kyushu: Fukuoka and Kumamoto)

Etymology. The species name refers to the yellow coxae.

Remarks. Among Japanese species, *G. fulvicoxa* sp. nov. is very similar to *G. japonicum* (Ashmead, 1904) in the sculpture of the head but differs from it in the shape of the horizontal portion of the occipital carina (*G. fulvicoxa* (Fig. 4A): straight, short; *G. japonicum* (Fig. 4B): curved, relatively long), sculpture of mesopleuron (carinae of *G. fulvicoxa* (Fig. 2A) stronger than *G. japonicum* (Fig. 2B)) and the color of the coxae (*G. fulvicoxa* (Fig. 2A): yellow; *G. japonicum* (Fig. 2B): brown). The sculpture of the frons in *G. fulvicoxa* (Fig. 4A) is finer than that of *G. japonicum* (Fig. 4B). Russian Far Eastern species, *G. amissum* Kozlov & Kononova, 1990, is also similar to *G. fulvicoxa* in the shape of the horizontal portion of the occipital carina. However, in *G. amissum*, the sculpture of frons is regularly arranged like *G. yamagishii*, the sculpture of mesopleuron is transversely costate with granulate sculptute between lower costae, mesopleural carina is weak, and the color of coxa is dark brown to black. Talamas and Pham (2017) provided images of type specimens of Vietnamese Scelionidae deposited in Institute of Ecology and Biological Resources, Hanoi, Vietnam, and we also examined these type specimens. According to these images and our examination, *G. alames* Kozlov & Lê, 1996, *G. avanus* Kozlov & Lê, 1996, and *G. cromion* Kozlov & Lê, 1997 have a horizontal portion of the occipital carina similar to *G. fulvicoxa*. The color of coxa of these species are dark brown to black, however, that of *G. fulvicoxa* is yellow.

***Gryon japonicum* (Ashmead, 1904)**
Figs 1B, 2B, 3B, 4B, 5B, H, 6B, 7A, B, 8A, B, 9A, B

Hadronotus japonicus Ashmead, 1904b: Kieffer 1926. *Gryon japonicus* (Ashmead): Masner and Muesebeck 1968; Mineo 1979. *Gryon japonicum* (Ashmead): Mineo 1981; Noda and Hirose 1989; Noda 1989, 1990a, b; Johnson 1992; Noda 1993; Kikuchi et al. 1995; Teraoka and Numata 1997; Lê 2000; Kononova and Kozlov 2008.

Hadronotus hakonensis Ashmead, 1904b. *Gryon hakonensis* (Ashmead): Masner and Muesebeck 1968. *Gryon hakonensis* (Ashmead): Mineo 1981; Kikuchi and Kuranouchi 1985 (misidentification); Kikuchi et al. 1986 (misidentification).

Telenomus orestes Dodd, 1913. *Liophanurus orestes* (Dodd): Kieffer 1926. *Gryon orestes* (Dodd): Johnson 1988; Mineo 1990a (misidentification); Johnson 1992; Kononova and Kozlov 2008 (misidentification).

Hadronotus flavipes Ashmead, 1905: Kieffer 1926; Baltazar 1966. *Gryon ferus* Masner & Muesebeck, 1968. *Gryon flavipes* (Ashmead): Mineo 1979, 1981, 1990a (syn.); Johnson 1992.

Telenomoides flavipes Dodd, 1913. *Hadronotus rufipes* (Dodd): Dodd 1914. *Plastogryon rufipes* (Dodd): Dodd 1915. *Hadronotus rufipes* (Dodd): Kieffer 1926. *Gryon rufipes* (Dodd): Galloway 1976; Mineo 1990a (syn.); Johnson 1992.

Telenomoides giraulti Dodd, 1913. *Hadronotus giraulti* (Dodd): Dodd 1914; Dodd 1915; Kieffer 1926; Galloway 1976; Mineo 1990a (syn.); Johnson 1992.

Telenomoides bicolor Dodd, 1913. *Hadronotus affinis* Dodd, 1914: Dodd 1915. *Hadronotus doddi* Kieffer, 1926. *Hadronotus affinis* Dodd: Galloway 1976; Mineo 1990a (syn.); Johnson 1992.

Plastogryon fuscus Dodd, 1915. *Gryon fuscus* (Dodd): Galloway 1976; Mineo 1990a (syn.); Johnson 1992.

Hadronotus leptocorisae Nixon, 1934. *Gryon nixoni* Masner, 1965: Mineo 1979 (syn.); Mineo 1981; Mineo 1990a; Johnson 1992.

Gryon mischa Kozlov & Kononova, 1989: Kozlov and Kononova 1990; Johnson 1992; Kononova 1995; Kononova and Petrov 2002; Kononova and Kozlov 2008. syn. nov.

Diagnosis. Frontal depression with strongly transversely irregular costate sculpture. Horizontal portion of occipital carina curved, reaching longitudinal extension line of inner margin of lateral ocelli. Coxae brown-black.

Description. Female. Length 1.1–1.7 mm.

Color. (Figs 1B, 2B). ***Body*** mainly black. A2–6 brown. A1, mandibles, and legs (excluding coxae) yellow.

Head. FCI = 1.06–1.27; LCI = 1.43–1.61; DCI = 1.76–1.94; HW/IOS = 1.67–1.87; head about 1.3 times as wide as mesosoma (HW/TSL = 1.16–1.34). Frons (Fig. 3B) reticulate with setae; central carina present ventrally; frontal depression weakly developed, with strongly transverse irregularly costate sculpture. Vertex reticulate with setae; interocellar space reticulate; hyperoccipital carina absent; POL about

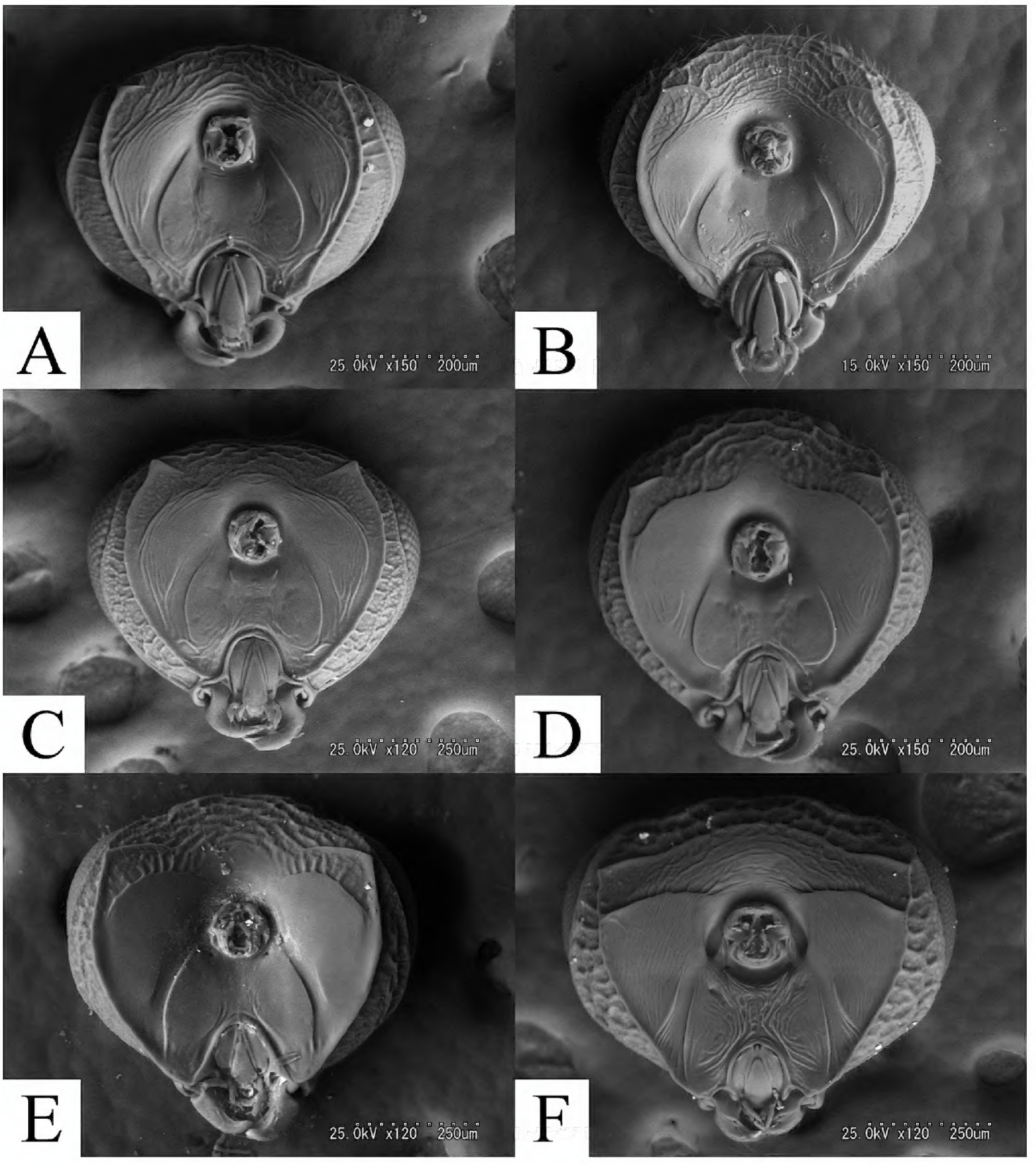

Figure 4. Occiput of Japanese *Gryon* spp. **A** *G. fulvicoxa* sp. nov. **B** *G. japonicum* **C** *G. yamagishii* **D** *G. philippinense* **E** *G. shisa* sp. nov. **F** *G. pennsylvanicum.*

4***.5 times*** as long as OOL (POL/OOL = 4.23–4.74); OOL about 0.4 times as long as LOL (OOL/LOL = 0.37–0.47). Clypeus trapezoidal, with rounded corners. Gena coriaceous with setae; medial genal carina absent. Occiput (Fig. 4B) transversely costate with setae; occipital carina complete; angular point of occipital carina developed; horizontal portion of occipital carina curved, reaching longitudinal extension line of inner margin of lateral ocelli; postoccipital carina discontinuity present; postgena weakly costate along postoccipital carina; postgenal sulcus curved toward hypostoma; postgenal bridge smooth, weakly longitudinally costate beside median sulcus. Antennae

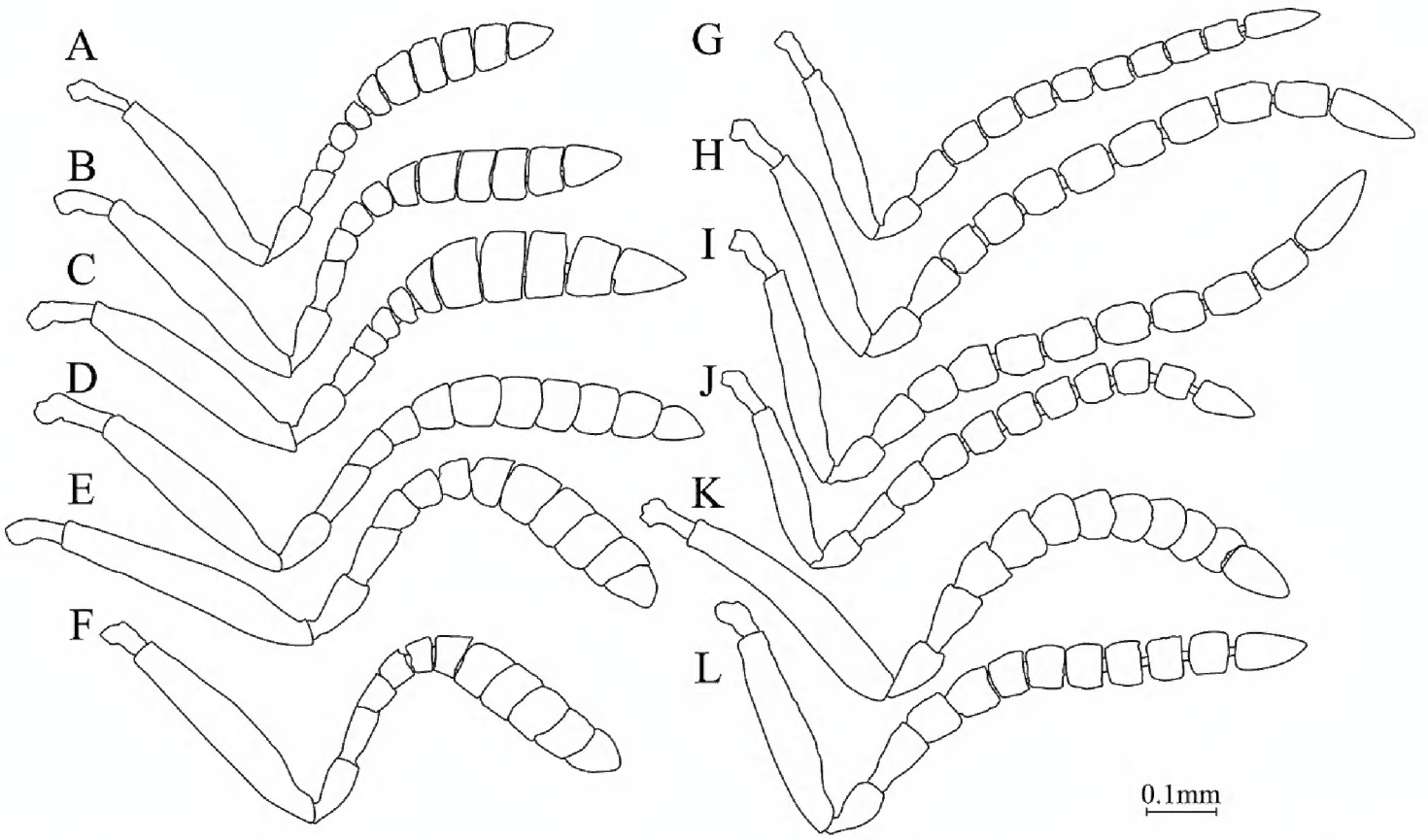

Figure 5. Antennae of Japanese *Gryon* spp. **A** *G. fulvicoxa* sp. nov., female **B** *G. japonicum*, female **C** *G. yamagishii*, female **D** *G. philippinense*, female **E** *G. shisa* sp. nov., female **F** *G. pennsylvanicum*, female **G** *G. fulvicoxa* sp. nov., male **H** *G. japonicum*, male **I** *G. yamagishii*, male **J** *G. philippinense*, male **K** *G. shisa* sp. nov., male **L** *G. pennsylvanicum*, male.

(Fig. 5B) clavate; A1 about 4.3 times longer than radicle, as long as clava; clava with five segments; claval sensilla formula A8–12/2–2–2–2–1; claval length about 3.6 times longer than width. Mandibles thin, tridentate, anterior tooth longer than other teeth.

Mesosoma. Cervical pronotal area granulate with dense setae; epomial carina strongly present, not reaching dorsal edge; pronotal suprahumeral sulcus foveolate, unclear mesad; lateral pronotal area smooth with transverse sparse carinae. Propleuron weakly transversely costate. Mesoscutum (Fig. 7A) about 1.5 times as wide as long (TSL/ML = 1.39–1.67) with dense setae, reticulate anter***iorly, longitudinally costate posteriorly; parascutal carina absent; notaulus absent. Mesoscutellum about 2.2 times as wide as long (SW/SL = 1.98–2.35), with dense setae, longitudinally costate mesad, granulate laterad. Mesopleuron (Fig. 7B) smooth with weak transverse dense carinae above mesopleural canina, smooth with sparse setae below mesopleural canina; prespecular and mesepisternal sulci foveolate; prespecular sulcus with setae; mesopleural carina strongly present; postacetabular sulcus foveolate. Metascutellum (Fig. 8B) weakly produced, longitudinally striate. Dorsal metapleural area (Fig. 7B) smooth with setae dorsad; ventral metapleural area weakly rugulose with setae; anterior part of metapleural sulcus and upper paracoxal sulcus with setae. Propodeum foveolate with setae. Fore wing (Fig. 6B): stigmal vein about 1.8 times longer than marginal vein; postmarginal vein about 3.3 times longer than marginal vein.***

Metasoma. T1 (Fig. 9A) longitudinally striate, setose laterally. S1 (Fig. 9B) longitudinally striate. T2 longitudinally striate anteriorly, reticulate posteriorly, setose

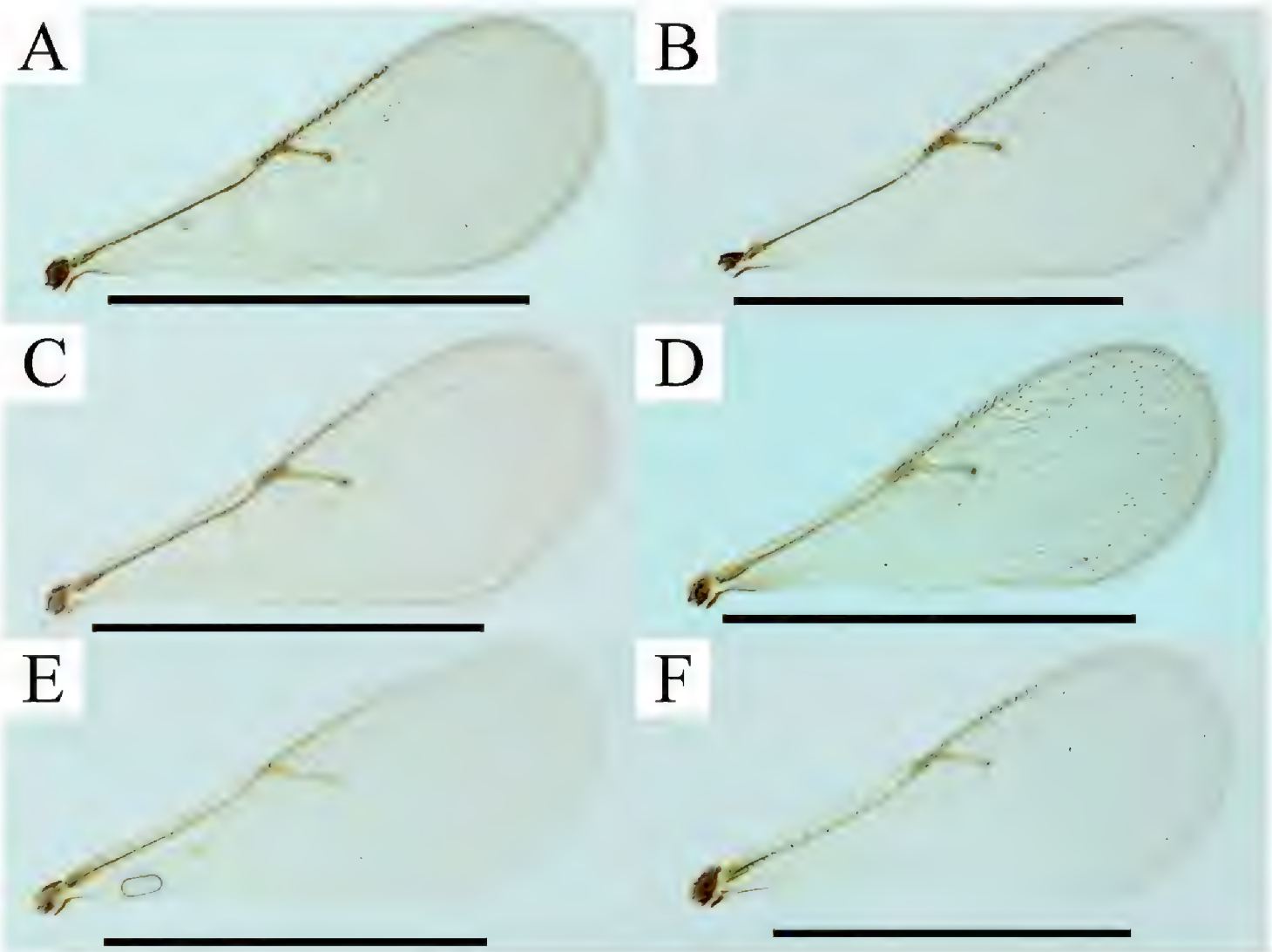

Figure 6. Forewing of Japanese *Gryon* spp. **A** *G. fulvicoxa* sp. nov. **B** *G. japonicum* **C** *G. yamagishii* **D** *G. philippinense* **E** *G. shisa* sp. nov. **F** *G. pennsylvanicum.*

laterally. S2 with setae, granulate mesad, striate laterad. T3 reticulate, with setae laterad and posteriorly. S3–6 punctate with setae. T4 punctate-striate with setae. T5–6 punctate with setae.

Male. Almost same as female, but antennae (Fig. 5H) filiform; A1 yellow, A2–11 brown.

Variation. This species has a correlation between the size of specimens and the convexity of the frons: in small specimens the frons is more convex than in large specimens. This correlation is also known in *G. pennsylvanicum* (Ashmead, 1893) (Masner 1983). Small (or minute) specimens of *G. japonicum* emerged from *Riptortus pedestris* (Linnaeus, 1758), *Leptocorisa chinensis* Dallas, 1852, *Cletus punctiger* (Dallas, 1852), and *Acanthocoris sordidus* (Thunberg, 1783). Hosts of large specimens are still unknown.

Host. Coreidae: *A. sordidus*, *Cletus trigonus* (Thunberg, 1783), and *C. punctiger* new record; Alydidae: *R. pedestris*, *Leptocorisa varicornis* (Fabricius, 1803), *L. acuta* (Thunberg, 1783), and *L. chinensis*. Noda (1990b) reported that *G. japonicum* also emerged from sentinel eggs of *C. schmidti* (Kritshenko, 1916) (Coreidae).

Biology. In spring, the female is found on blossoms of *Acer palmatum* (Sapindaceae).

Material examined. *Holotype.* *Gryon mischa*: Япония, Каганихара. [= Japan: Gifu pref., Kakamigahara city] 19.X.1981. E. Sugonjaev leg. ♀ [ZIN].

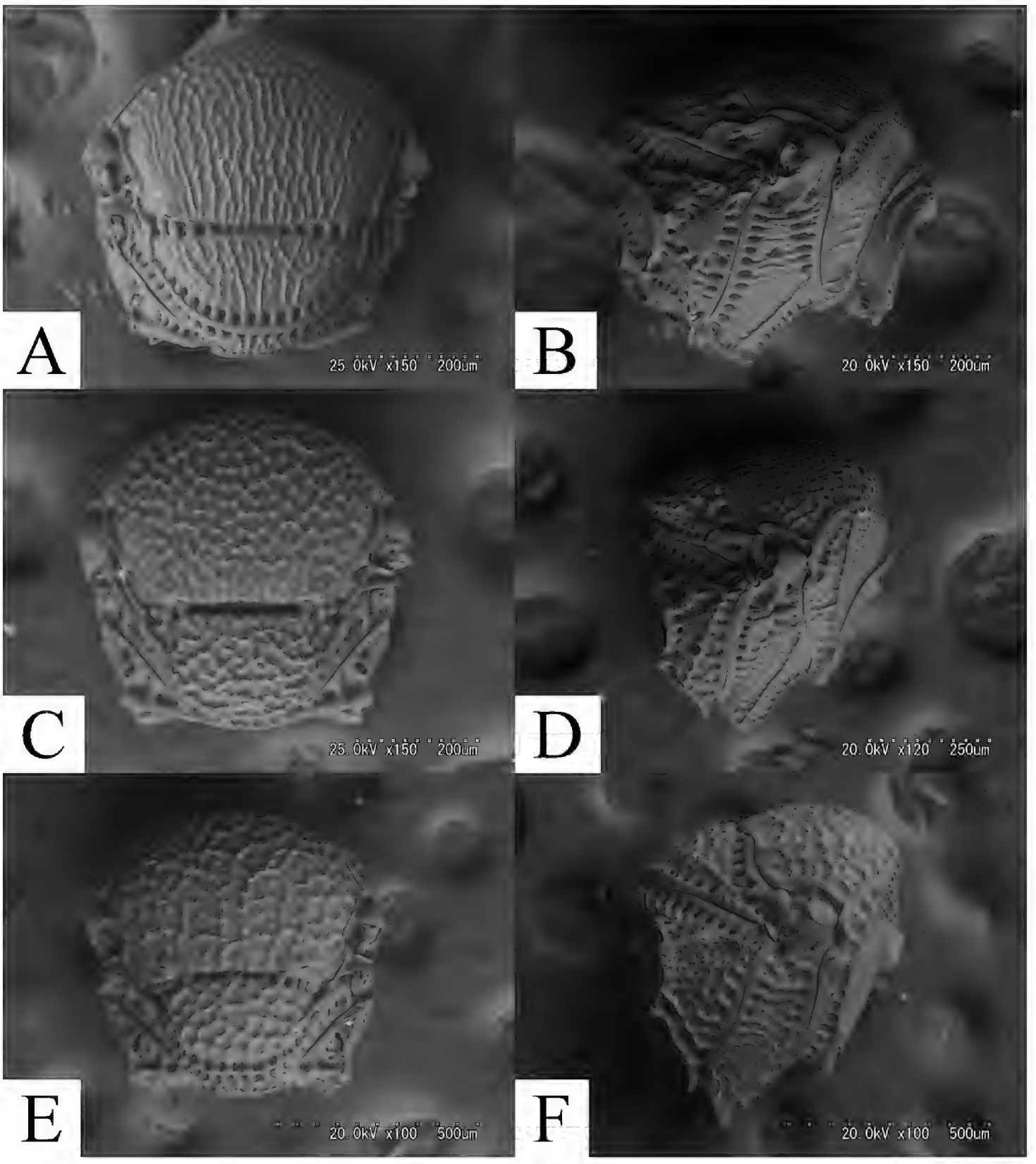

Figure 7. Mesosoma of Japanese *Gryon* spp. **A** *G. japonicum*, dorsal view **B** lateral view **C** *G. philippinense*, dorsal view **D** lateral view **E** *G. pennsylvanicum*, dorsal view **F** lateral view.

Other materials. Iwate pref., Morioka city, Yamagishi. 8.VIII.1985. Yoshimi Hirose leg. (emerged from eggs of *Riptortus pedestris* on soybean plant) 2♂2♀ [ELKU]; Ibaraki pref., Mito city. Kami-kunii-chô. 25.VII.1986. Ryutaro Komori leg. (emerged from an egg of *R. pedestris*) 1♀ [ELKU]; Hitachi-Ôta city, Chinone-chô. 2–.VII.1986. Ryutaro Komori leg. (emerged from eggs of *R. pedestris*) 3♂18♀ [ELKU]; Hitachi-Ôta city, Zuiryû-chô. 2–.VII.1986. Ryutaro Komori leg. (emerged from eggs of *R. pedestris*) 2♂7♀ [ELKU]; Tsuchiura city, Hitana. 2*.VII.1986. Ryutaro Komori leg. (emerged from eggs of *R. pedestris*) 3♂12♀ [ELKU]; Tsuchiura city (near Tsukuba),

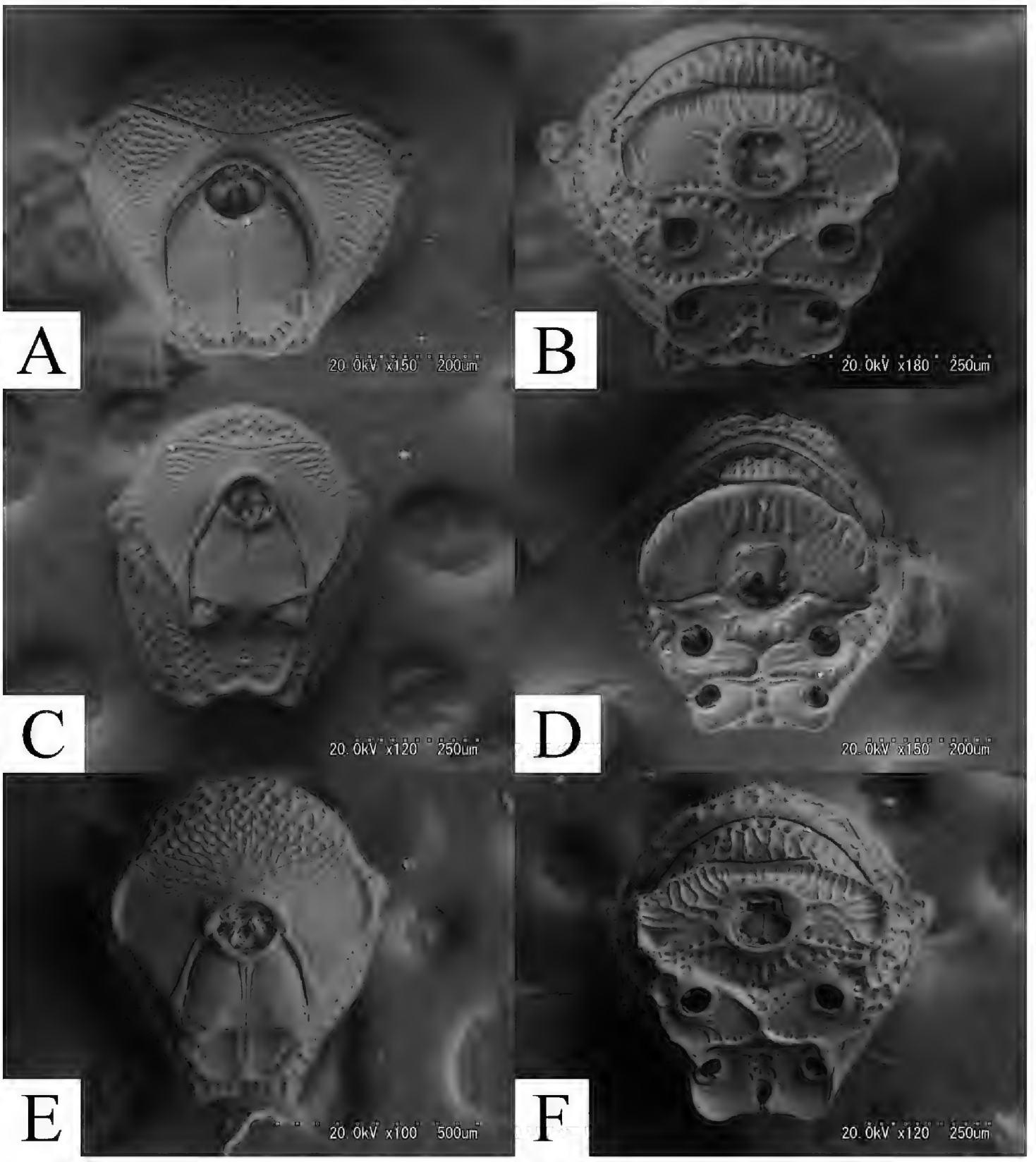

Figure 8. Mesosoma of Japanese *Gryon* spp. **A** *G. japonicum*, anterior view **B** posterior view **C** *G. philippinense*, anterior view **D** posterior view **E** *G. pennsylvanicum*, anterior view **F** posterior view.

Pond Shishituka-Ôike. 15.VII.1997. Victor Fursov leg. 2♀ [IZAN]; Tsukuba dist., Yatabe town, Kan'nondai, National Institute for Agro-Environmental Sciences. 22–24.VIII.1983. Takashi Noda leg. (emerged from eggs of *R. pedestris*) 1♂1♀ [ELKU]; 16–23.VIII.1985. Takashi Noda leg. (emerged from eggs of *R. pedestris*) 3♂8♀ [ELKU]; 12.VIII.1989. Takachi Noda leg. (emerged from eggs of *L. chinensis*) 4♂8♀ [ELKU]; Tsukuba dist., Yatabe town, Kan'nondai, National Agriculture Research Center. 27–28.VII.1984. Atsushi Kikuchi leg. (emerged from eggs of *R. pedestris*) 1♂5♀ [ELKU]; Tsukuba dist., Yawara vill., rice fields. 29.VII.1997. Victor Fursov

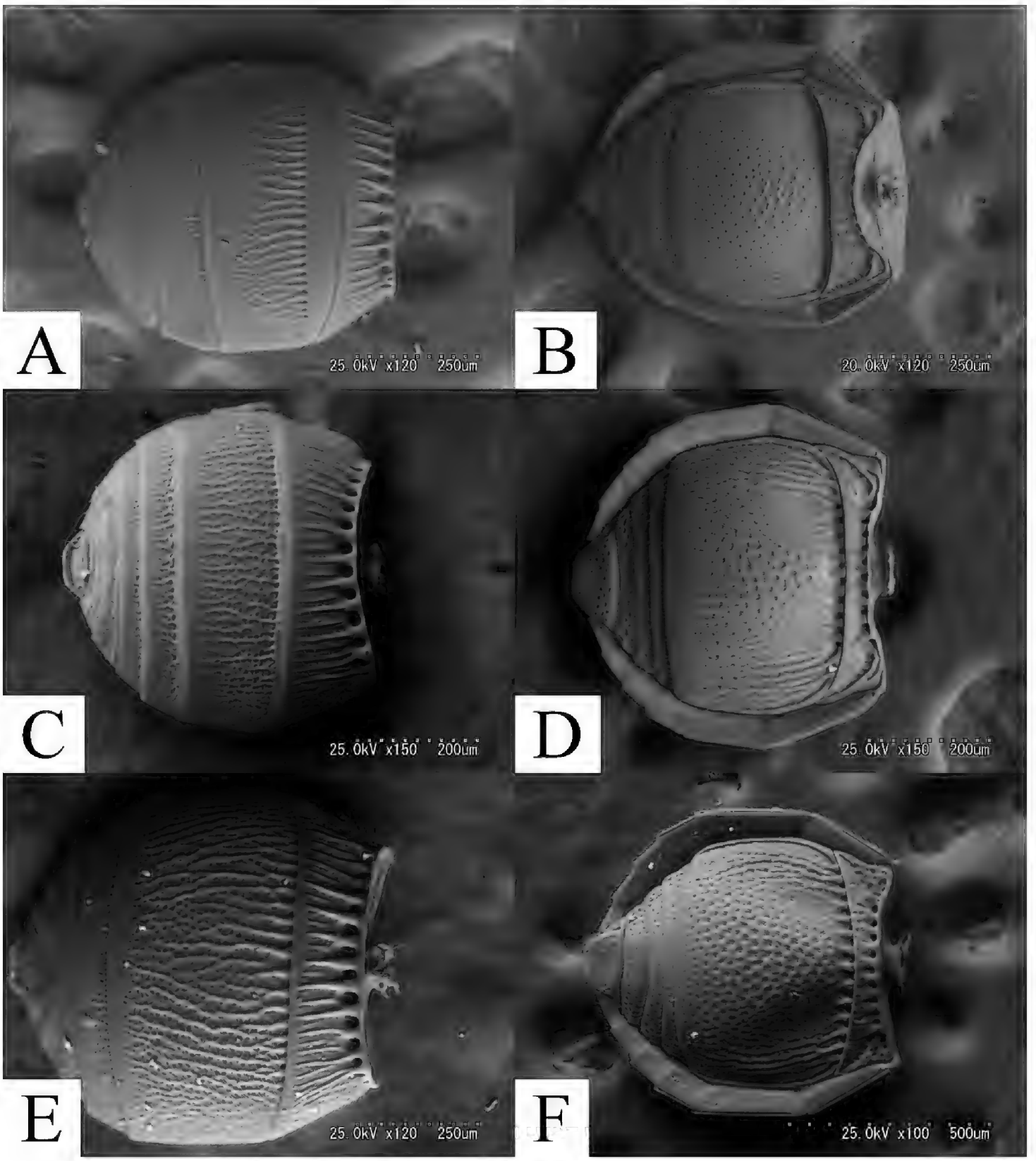

Figure 9. Metasoma of Japanese *Gryon* spp. **A** *G. japonicum*, dorsal view **B** ventral view **C** *G. philippinense*, dorsal view **D** ventral view **E** *G. pennsylvanicum*, dorsal view **F** ventral view.

leg. 2♀ [IZAN]; 22.VI.1999. Victor Fursov leg. 1♂2♀ [IZAN]; Inashiki dist. (near Tsukuba), Kukizaki town. 14.VI.1997. Victor Fursov leg. 1♂ [IZAN]; Saitama pref., Kitamoto city. 5–13.VI.1979. Kiyomitsu Ito leg. (emerged from eggs of *R. pedestris*) 6♂12♀ [ELKU]; IX.1980. Kiyomitsu Ito leg. (emerged from eggs of *Cletus punctiger*) 1♂8♀ [ELKU]; Chiba pref., Chiba city, Daizen'nochô, Chiba-Ken Agricultural Experiment Station (Soybean field) 3.X.1985. Masaaki Sawada leg. (emerged from eggs of *Acanthocoris sordidus*) 5♂5♀ [ELKU]; Ishikawa pref., Nomi city, Mitsukuchi (paddy field) 28.V–8.I.2011, H. Fukutomi and R. Ishiguro leg. (MT) 2♀ [ELMU];

19. VIII–7.IX.2011, H. Fukutomi and R. Ishiguro leg. (MT) 1♀ [ELMU]; 22.IX–5.X.2011, H. Fukutomi and R. Ishiguro leg. (MT) 2♂ [ELMU]; Fukui pref., Fukui city, Ryômachi, Fukui Agricultural Experiment Station. 6.IX.1983. Kazuo Imamura leg. (emerged from eggs of *R. pedestris*) 1♂3♀ [ELKU]; Mt. Tenjosau. 24.VII.1956. Yozo Murakami leg. (with identification label; *Gryon japonicus* (Ashm.) det. G. Mineo, 1978); Gifu pref., Kani city, Katabira, 3–9.IX.2004. Kenzo Yamagishi leg. (MT) 1♀ [ELMU]; Aichi pref., Nagoya city, Chikusa ward, Higashiyama Park. IV–VI. 1997, Victor Fursov leg. 1♂22♀ [IZAN]; Tempaku ward, 24.IX.2012. Kenzo Yamagishi leg. 1♂ [ELKU]; Ichinomiya city, Tomida, Kiso river. 26.IX.2013. Y. Miyata leg. (YPT) 1♂1♀ [ELMU]; Kasugai city, Takagi. 29.VIII.2000. C. Mizuno and M. Suzuki leg. (MT) 1♀ [IZAN]; 20.IX.2000. C. Mizuno and M. Suzuki leg. (MT) 1♂ [IZAN]; 21.IX.2000. C. Mizuno and M. Suzuki leg. (MT) 1♂ [IZAN]; 22.IX.2000. C. Mizuno and M. Suzuki leg. (MT) 1♀ [IZAN]; 16.VII.2013. Y. Kamiya leg. (YPT) 1♂2♀ [ELMU]; 31.VII.2013. Y. Kamiya leg. (YPT) 4♂ [ELMU]; 13.VIII.2013. Y. Kamiya leg. (YPT) 1♂3♀ [ELMU]; 17.IX.2013. Y. Kamiya leg. (YPT) 1♀ [ELMU]; Nisshin city, Komenogi, 28. V–3.VI.2011. H. Seo and R. Mizutani leg. (MT) 1♀ [ELMU]; 3–10.IX.2011. H. Seo and R. Mizutani leg. (MT) 1♂ [ELMU]; 17–25. IX.2011. H. Seo and R. Mizutani leg. (MT) 1♂ [ELMU]; 16–22.X.2011. H. Seo and R. Mizutani leg. (MT) 1♀ [ELMU]; Nisshin city, Nokata, 3–10.IX.2011. H. Seo and R. Mizutani leg. (MT) 1♀ [ELMU]; 2–9.X.2011. H. Seo and R. Mizutani leg. (MT) 1♀ [ELMU]; Aichi dist., Nagakute town, Yazako, Sagamine, Aichi Agricultural Research Center. 15–21.VIII.2008. Kenzo Yamagishi and K. Fukushima leg. (MT) 3♀ [ELMU]; 29.VIII–4.IX.2008. Kenzo Yamagishi and K. Fukushima leg. (MT) 3♀ [ELMU]; 12–18.IX.2008. Kenzo Yamagishi and K. Fukushima leg. (MT) 1♂6♀ [ELMU]; 26. IX–2.X.2008. Kenzo Yamagishi and K. Fukushima leg. (MT) 2♂2♀ [ELMU]; 9–16.X.2008. Kenzo Yamagishi and K. Fukushima leg. (MT) 1♂ [ELMU]; 23–29.X.2008. Kenzo Yamagishi and K. Fukushima leg. (MT) 2♂ [ELMU]; Nagakute town, near water channel. 7.VII.2004. Victor Fursov leg. 1♀ [IZAN]; Shiga pref. 1.VIII.1974. Y. Hasegawa leg. (emerged from an egg of *Leptocorisa chinensis*) 1♂ [NIAES]; 2.VIII.1974. Y. Hasegawa leg. (emerged from an egg of *C. punctiger*) 1♀ [NIAES]; 5.VIII.1974. Y. Hasegawa leg. (emerged from eggs of *L. chinensis*) 1♂8♀ [NIAES]; 10.VIII.1974. Y. Hasegawa leg. (emerged from eggs of *L. chinensis*) 6♀ [NIAES]; Ôtsu city, Dô. 10.VI.2018. Hiroya Higuchi leg. (emerged from sentinel eggs of *C. punctiger*) 1♂1♀ [ELKU]; Kyoto pref., Kyoto city, Kurama. 13.VII.1992. Takeshi Teraoka leg. (emerged from eggs of *R. pedestris*) 2♂2♀ [ELKU]; Tokushima pref., Zen'nyuji-toh (River island in Yoshino River), 13–22.V.2003. K. Ohara and H. Otsuka leg. (MT) 3♀ [ELMU]; 6–18.VI.2003. K. Ohara and H. Otsuka leg. (MT) 4♀ [ELMU]; 5–17.IX.2003. K. Ohara and H. Otsuka leg. (MT) 3♂2♀ [ELMU]; Ehime pref., Matsuyama city, Tarumi, Ehime University, 8.II.2016. Yu Hisasue leg. (sweeping of trees) 1♀ [ELKU]; Kôchi pref., Shimanto city, Tosa-Nakamura, Nyûta, Hiramoto. 33.004°N, 132.898°E; alt. 10 m. 6–9.IX.2017. Y. Komeda leg. (YPT) 1♀ [ELKU]; Fukuoka pref., Fukuoka city, Hakozaki. 26.V.1969. Osamu Yata leg. 1♀ [ELKU]; Fukuoka city, Hakozaki, Tsuya-Honmachi. (paddy field) 15.VIII.1973. Chiyoko

Okuma leg. 1♂ [ELKU]; Fukuoka city, East ward, Hakozaki, Kyushu Univ. Matsubara Farm. 16.X.1993. Hiroshi Honda leg. (YPT) 1♂ [ELKU]; 23.X.1993. Hiroshi Honda leg. (YPT) 3♂ [ELKU]; 30.X.1993. Hiroshi Honda leg. (YPT) 3♂ [ELKU]; Fukuoka city, Mt. Tachibana-yama, 6.V.1968. N. Yoshida leg. 1♀ [ELKU] (with identification label; *Gryon japonicus* det. G. Mineo); 25.VI.1994. Hiroshi Honda leg. (YPT) 1♂ [ELKU]; Fukuoka city, East ward, Tatara. 2.IX.1996. Yoshimitsu Higashiura leg. 1♀ [ELKU]; Fukuoka city, Ropponmatsu, Gokoku-Jinja shrine. 18.VI.1969. Minoru Miyazaki leg. 1♀ [ELKU]; Kasuya dist., Sasaguri town, Mt. Wakasugi-yama. 13.V.1969. Minoru Miyazaki leg. 1♀ [ELKU]; Tagawa dist., Soeda town, Mt. Hikosan. 26.VII.1966, Kôichi Takeno leg. 2♀ [ELKU]; 17.VII.1967, Kôichi Takeno leg. 1♀ [ELKU]; 18.VII.1968. Kenkichi Kanmiya leg. 2♀ [ELKU]; 11.VII.1969. Kenkichi Kanmiya leg. 2♂1♀ [ELKU]; 6.VIII.1969. Kenkichi Kanmiya leg. 1♀ [ELKU]; 16.X.1969, Kôichi Takeno leg. (MT) 1♀ [ELKU]; 25.VII.1970, Kôichi Takeno leg. (MT) 1♂ [ELKU]; 20.V.1971, Michitaka Chujo leg. 1♀ [ELKU]; 22–26.V.1979, Kaoru Maeto leg. 1♀ [NIAES]; Nagasaki pref., Minami-Takaki dist., Kuchinotsu town. 23.IV.1954. S. Kato leg. 1♀ [NIAES]; Kumamoto pref., Aso dist., Takamori town. 11.X.1993. N. Wasano leg. 1♂ [ELKU]; Hondo city, Nishinoku Lake, 5.VI.1999. Victor Fursov leg. 3♀ [IZAN]; Miyazaki pref., Koyu dist., Takanabe town, Minami-Takanabe, Horinouchi. 16.VII.1964. K. Yasumatsu and T. Nishida leg. 1♀ [ELKU] (with identification label; *Gryon flavipes* (Ashm.) det. G. Mineo); Kagoshima pref., Kagoshima city, 18.VII.1969, Osamu Yata leg. 1♂1♀ [ELKU]; 20.VII.1969, Minoru Miyazaki leg. 2♀ [ELKU]; Kumage Dist., Yaku-shima Isl., Yaku town, Kurio, 8.VII.1975. Kenzo Yamagishi leg. 1♂2♀ [ELKU]; Ôshima dist., Toku-no-shima Isl., Amagi town, Nishi-Agina, Mikyo. 27.VII.1963. J. L. Gressitt leg. 1♀ [ELKU]; Okinawa pref., Okinawa Isl., Kunigami dist., Kunigami town, Yona. 18–21.X.1973. M. Owada leg. 1♀ [SEHU]; Yaeyama dist., Iriomote Isl., Taketomi town, Shirahama, 21.VII.1963, Yorio Miyatake leg., 1♀ [ELKU]; Taketomi town, Sonai. 12.X.1963. Shoichi Miyamoto leg. 1♀ [ELKU] (with identification label; *Gryon flavipes* (Ashm.) det. G. Mineo); Taketomi town, Komi (Paddy field). 24.330°N, 123.912°E; alt. 10 m, 22–25.VI.2015, Yoto Komeda leg. (YPT) 1♀ [ELKU].

Distribution. Japan (Honshu: Iwate, Ibaraki, Saitama, Chiba, Kanagawa, Ishikawa, Fukui, Gifu, Aichi, Shiga, and Kyoto; Shikoku: Tokushima, Ehime, and Kochi; Kyushu: Fukuoka, Nagasaki, Kumamoto, Miyazaki, and Kagoshima; Ryukyus: Yakushima Isl., Toku-no-shima Isl., Okinawa Isl., and Iriomote Isl.), South Korea (North Gyeongsang: Andong), Vietnam (Hanoi).

Remarks. Talamas et al. (2017) provided photographs of the holotype of *G. japonicum*. Based on these photographs, morphological characters of specimens examined in this study are the same as the holotype. *Gryon orestes* (Dodd, 1913) is recorded from Japan as *G. flavipes* (Ashmead, 1905) in Mineo (1979) and *G. nixoni* (Masner, 1965) in Mineo (1981). We examined the voucher specimen determinated by Mineo, and found that the specimen is a small individual of *G. japonicum*. We also examined the holotype of *G. mischa* held at ZIN, and confirmed that it is also *G. japonicum*.

***Gryon yamagishii* Mineo, 1981**
Figs 1C, 2C, 3C, 4C, 5C, I, 6C

Gryon yamagishii Mineo, 1981: Johnson 1992; Kononova and Petrov 2002; Kononova and Kozlov 2008.
Gryon maruzzae Mineo, 1981: Johnson 1992; Kononova and Kozlov 2008. syn. nov.
Gryon sugonjaevi Kozlov & Kononova, 1989: Kozlov and Kononova 1990; Johnson 1992; Kononova 1995; Kononova and Petrov 2002; Kononova and Kozlov 2008. syn. nov.

Diagnosis. Frontal depression transversely costate by strong regular carinae. Angular points of occipital carina modified as short sharp horns; horizontal portion of occipital carina straight, expanding inwardly. Coxae brown-black.

Description. Female. Length = 1.4–1.6 mm.

Color. (Figs 1C, 2C). ***Body*** mainly black. A2–6 brown. A1, mandibles, and legs (excluding coxae) yellow.

Head. FCI = 1.16–1.28; LCI = 1.66–1.62; DCI = 2.03–2.23; HW/IOS = 1.64–1.78; head about 1.3 times as wide as mesosoma (HW/TSL = 1.24–1.30). Frons (Fig. 3C) reticulate with setae; central carina present ventrally; frontal depression weakly developed, transversely costate by strong regular carinae. Vertex reticulate with setae; interocellar space reticulate; hyperoccipital carina absent; POL about 4.6 times as long as OOL (POL/OOL = 3.67–4.83); OOL about 0.4 times as long as LOL (OOL/LOL = 0.33–0.50). Clypeus semi-elliptical. Gena coriaceous with setae; medial genal carina absent. Occiput (Fig. 4C) transversely costate with setae; occipital carina complete; angular points of occipital carina well-developed, as short sharp horns; horizontal portion of occipital carina straight, expanding inwardly; postoccipital carina discontinuity present; postgena weakly costate along postoccipital carina; postgenal sulcus curved toward hypostoma; postgenal bridge smooth, weakly longitudinally costate beside median sulcus. Antennae (Fig. 5C) clavate; A1 about 3.5 times longer than radicle, as long as clava; clava with five segments; claval sensilla formula A8–12/2–2–2–2–1; claval length about 3.4 times longer than width. Mandibles thin, tridentate, anterior tooth longer than other teeth.

Mesosoma. Cervical pronotal area granulate-punctate with dense setae; epomial carina strongly present, not reaching dorsal edge; pronotal suprahumeral sulcus foveolate, unclear mesad; lateral pronotal area smooth with transverse dense carinae. Propleuron weakly transversely costate. Mesoscutum about 1.4 times as wide as long (TSL/ML = 1.35–1.50), with dense setae, reticulate in anterior, longitudinally costate in posterior; parascutal carina absent; notaulus absent. Mesoscutellum about 2.2 times as wide as long (SW/SL = 2.07–2.35), with dense setae, longitudinally costate mesad, granulate laterad. Mesopleuron smooth with transverse dense carinae above mesopleural canina, rugulose with setae below mesopleural canina; prespecular and upper mesepisternal sulci foveolate; prespecular sulcus with setae; mesopleural carina strongly

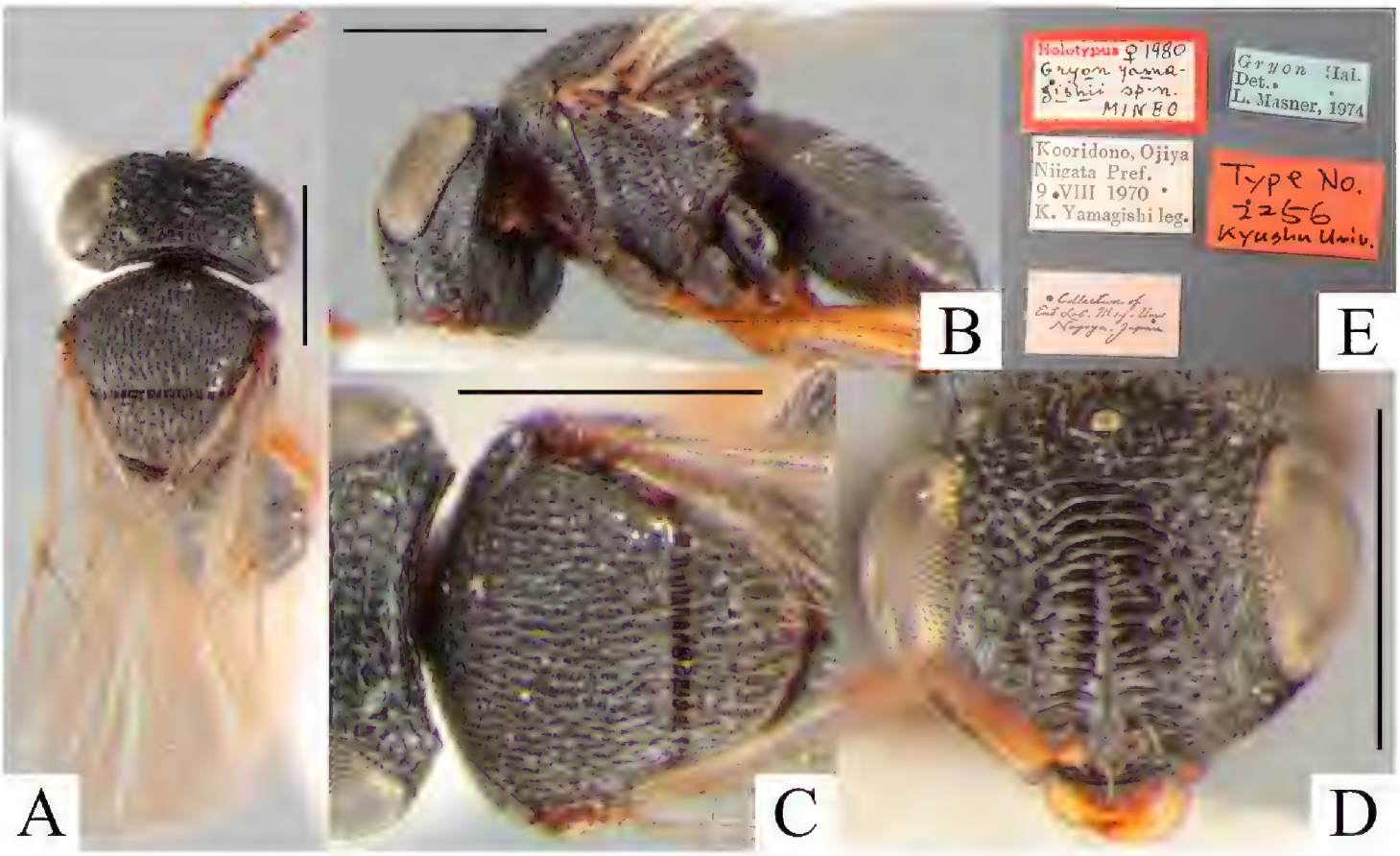

Figure 10. The holotype of *G. yamagishii* **A** dorsal view **B** lateral view **C** mesosoma, dorsal view **D** frons **E** labels.

p***resent;*** postacetabular sulcus foveolate. Metascutellum weakly produced, longitudinally striate. Metapleuron weakly convex, foveolate-rugulose, with dense setae posteriorly; anterior part of metapleural sulcus and upper paracoxal sulcus with setae. Propodeum foveolate with setae. Fore wing (Fig. 7C); stigmal vein about 2.5 times longer than mar**ginal** vein; postmarginal vein about 3.7 times longer than marginal vein.

Metasoma. T1 longitudinally striate, setose laterally. S1 longitudinally striate. T2 longitudinally striate anteriorly, reticulate posteriorly, setose laterally. S2 with setae, granulate mesad, striate laterad. T3 reticulate, with setae laterad and posteriorly. S3–6 punctate with setae. T4 punctate-striate with setae. T5–6 punctate with setae.

Male. Almost same as female, but antennae (Fig. 5I) filiform; A1 yellow, A2–11 brown.

Host. Unknown.

Biology. In winter, the female overwinters under the bark of *Zelkova serrata* (Thunberg) Makino (Ulmaceae).

Material examined. *Holotype.* *G. yamagishii*: Kooridono, Ojiya, Niigata Pref. [Japan: Niigata pref., Ojiya city, Nishi-Yoshidani, Kôridono.] 9.VIII.1970. K. Yamagishi leg. ♀ [ELKU] (Fig. 10). *G. maruzzae*: (Kyushu) Okinoshima (Chikuzen). [Japan: Fukuoka pref., Munakata dist., Munakata town, Chikuzen Oki-no-shima Isl.] 25–28.VII.1958, Hirashima, Murakami and Y. Miyatake leg. 1♂ [ELKU] (Fig. 11). *G. sugonjaevi*: Япония, Инуяма, 40 км СЗ Нагоя. [=Japan: Aichi pref., Inuyama city.] 4.X.1981. E. Sugonjaev leg. ♀ [ZIN].

Paratypes. *G. yamagishii*: same locality as holotype, 1.VIII.1970. K. Yamagishi leg. ♀ [ELKU]; Nisshin, Aichi-gun, Aichi pref. [Aichi pref., Aichi dist., Nisshin town], 5.V.1970. K. Yamagishi leg. ♀ [ELKU]. *G. sugonjaevi*: Япония, Каганихара. [= Japan: Gifu pref., Kakamigahara city] 19.X.1981. E. Sugonjaev leg. ♀ [IZAN].

Other material. Japan: Hokkaido, Sapporo city, Toyohira ward, Hitsujigaoka. 43.008°N, 141.415°E; alt. 100 m, 8–15.VI.2010, Kazuhiko Konishi leg. (MT) 5♀ [ELKU]; 15–22.VI.2010, Kazuhiko Konishi leg. (MT) 2♀ [ELKU]; 22–29.VI.2010, Kazuhiko Konishi leg. (MT) 2♀ [EUMJ]; 29.VI.–6.VII.2010, Kazuhiko Konishi leg. (MT) 2♀ [EUMJ]; 27.VII.–3.VIII.2010, Kazuhiko Konishi leg. (MT) 2♀ [EUMJ]; 10–17.VIII.2010, Kazuhiko Konishi leg. (MT) 2♀ [EUMJ]; Fukushima pref., Aizu-Wakamatsu city, Monden-machi, Kuroiwa, Minami-Aoki. 6.I.2017. Keisuke Narita leg. (Collected from under the bark of *Zelkova serrata*) 1♀ [ELKU]; Ibaraki pref., Tsuchiura city (near Tsukuba), Pond Shishituka-Ôike. 15.VII.1997. Victor Fursov leg. 1♀ [IZAN]; Tochigi pref., Nikko city, Tamozawa. 20–25.VI.2008. Takeyuki Nakamura leg. (MT) 1♀ [ELKU]; Niigata pref., Nagaoka city, Urase-machi, 37.464°N, 138.907°E, alt. 40 m, 2015.V.28.–VI. 7, Ryo Shimizu and So Shimizu leg. (MT), 6♀ [ELKU]; 2015. VI.7.–VI.18, Ryo Shimizu and So Shimizu leg. (MT), 8♀ [ELKU]; 2015.VII.6–25, Ryo Shimizu and So Shimizu leg. (MT), 5♂17♀ [ELKU]; 2015. VII.25–VIII.7, Ryo Shimizu and So Shimizu leg. (MT), 2♂16♀ [ELKU]; 2015. VIII.7–VIII. 22, Ryo Shimizu and So Shimizu leg. (MT), 5♂2♀ [ELKU]; 2015. VIII.22–IX.5, Ryo Shimizu and So Shimizu leg. (MT), 7♂2♀ [ELKU]; 2015. IX.27–X. 12, Ryo Shimizu and So Shimizu leg. (MT), 6♀ [ELKU]; 2016.VI.11–23, Ryo Shimizu and So Shimizu leg. (MT), 3♀ [ELKU]; 2016. VII.13–VIII.1, Ryo Shimizu and So Shimizu leg. (MT), 2♂12♀ [ELKU]; Ishikawa pref., Mt. Hakusan. 29–21. VIII.1960. Terunobu Hidaka leg. 1♂ [ELKU]; Hakusan city, San'nomiya, 9–22. VIII.2009, H. Fukutomi and S. Nakagawa leg. (MT) 1♀ [ELMU]; Nomi city, Mitsukuchi (paddy field) 30.IV–13.V.2011, H. Fukutomi and R. Ishiguro leg. (MT) 1♀ [ELMU]; 13–26.V.2011, H. Fukutomi and R. Ishiguro leg. (MT) 3♀ [ELMU]; 9–21. VI.2011, H. Fukutomi and R. Ishiguro leg. (MT) 3♀ [ELMU]; 17.VII.–4.VIII.2011, H. Fukutomi and R. Ishiguro leg. (MT) 1♂ [ELMU]; 19.VIII.–7.IX.2011, H. Fukutomi and R. Ishiguro leg. (MT) 1♂ [ELMU]; 8–21. IX. 2011, H. Fukutomi and R. Ishiguro leg. (MT) 1♀ [ELMU]; 22.X.–2.XI.2011, H. Fukutomi and R. Ishiguro leg. (MT) 1♀ [ELMU]; Gifu pref., Kani city, Katabira, 1–7.V.2004, K. Ito leg. (MT) 2♀ [ELMU]; 6–12.VIII.2004, Kenzo Yamagishi leg. (MT) 1♀ [ELMU]; 20–26. VIII.2004, Kenzo Yamagishi leg. (MT) 1♂1♀ [ELMU]; 2–8.X.2004. Kenzo Yamagishi leg. (MT) 3♀ [ELMU]; Shizuoka pref., Iwata city, dike of Ohta river, 29.VII.2001, M. Ura leg. (YPT) 1♀ [IZAN]; 13.VIII.2001, M. Ura leg. (YPT) 1♂ [IZAN]; 27. VIII.2001, M. Ura leg. (YPT) 1♂ [ELMU]; 1♂1♀ [IZAN]; Aichi pref., Nagoya city, Chikusa ward, Higashiyama Park. 1–10.V.2001. M. Watanabe leg. (MT) 1♀ [IZAN]; IV–VI. 1997, Victor Fursov leg. 25♀ [IZAN]; 11.VI.1997. Victor Fursov leg. 1♂ [IZAN]; Tempaku ward, Yagoto-Urayama, 21.IX.2002. Kenzo Yamagishi leg. 1♀ [ELMU]; Tempaku ward, 29.IX.2012. Kenzo Yamagishi leg. 1♀ [ELMU]; Tempaku

ward, Meijo University, 17.IV.2013. N. Kusuda leg. 1♀ [ELMU]; Tempaku ward, Meijo University, 31.VII.2013. N. Kusuda leg. 1♀1♀ [ELMU]; Ichinomiya city, Tomida, Kiso River, 10.V.2013, Y. Miyata leg. (YPT) 5♀ [ELMU]; 2.VII.2013, Y. Miyata leg. (YPT) 1♀ [ELMU]; 22.VIII.2013, Y. Miyata leg. (YPT) 1♀ [ELMU]; Kasugai city, Takagi (Grassland), 14.V.2013. Y. Kamiya leg. (YPT) 1♀ [ELMU]; 31. VII.2013. Y. Kamiya leg. (YPT) 1♂ [ELMU]; Nisshin city, Akaike, 30.IX.2006. Kenzo Yamagishi leg. 1♀ [ELMU]; Nisshin city, Nokata, 28.V–3.VI.2011. H. Seo and R. Mizutani leg. (MT) 1♀ [ELMU]; 10–17.VI.2011. H. Seo and R. Mizutani leg. (MT) 1♀ [ELMU]; 2–9.VI.2011. H. Seo and R. Mizutani leg. (MT) 1♀ [ELMU]; [ELMU]; 16–22.VI.2011. H. Seo and R. Mizutani leg. (MT) 1♂ [ELMU]; Toyota city, Obara, Kajiyashiki-chô, Nishinohara, 12.VI.–6. 2014. Hiroaki Iketake leg. (MT) 1♀ [ELKU]; 12–26.X.2014. Hiroaki Iketake leg. (MT) 1♀ [ELKU]; Osaka pref., Sen'nan Dist., Misaki town, Kyôshi, 16.IV.1975. 3♀ [ELKU]; Wakayama pref., Wakayama city, Sandô, 16.IV.1975. 1♀ [ELKU]; Shimane pref., Izumo city, Mt. Kita-yama, 11. VI.1969. Minoru Miyazaki leg. 1♀ [ELKU]; Tokushima pref., Zen'nyuji-toh (River island in Yoshino River), 13–22.V.2003. K. Ohara and H. Otsuka leg. (MT) 3♀ [ELMU]; 5–17.IX.2003. K. Ohara and H. Otsuka leg. (MT) 3♀ [ELMU]; Ehime pref., Matsuyama city, Sugitake. 26.V.1976. N. Takaki leg. 1♀ [EUMJ]; Matsuyama city, Komenono. 1.VI.1978. N. Takaki leg. 1♀ [EUMJ]; Matsuyama city, Jikiba-chô. 33.51°N, 132.42°E; 14.V.2016. K. Kuroda and K. Sogoh leg. 1♀ [EUMJ]; Matsuyama city, Suemachi, Wakigafuchi Park. 33.52°N, 132.49°E; 20.V.2017. K. Kuroda leg. 1♀ [EUMJ]; Ochi dist., Kamijima town, Iwagi, Akahone Isl., 29–30.XI.2004. Jirô Ogawa leg. 1♀ [EUMJ]; Kami-Ukena dist., Yanadani vill., Yokono (alt. 650 m). 7.V.1994. M. Sakai leg. 1♀ [EUMJ]; Kami-Ukena dist., Kuma-Kougen town, Saragamine. 4.VI.2006. Yûgo Satô leg. 1♀ [EUMJ]; Kami-Ukena dist., Kuma-Kougen town, Yurano. 5.VI.2007. Eiji Yamamoto leg. 1♀ [EUMJ]; 17.VII.2007. Eiji Yamamoto leg. 1♀ [EUMJ]; 24–26.VII.2008. Eiji Yamamoto leg. 1♀ (MT) [EUMJ]; Kita dist., Uchiko town, Hongawa, Hirose shrine. 21.V.2014. Eiji Yamamoto leg. 2♀ [EUMJ]; Kita dist., Uchiko town, Hiraoka. 11–15.V.2014. Eiji Yamamoto leg. (MT) 1♀ [EUMJ]; 16–20.V.2014. Eiji Yamamoto leg. (MT) 2♀ [EUMJ]; Kôchi pref., Nankoku city, Estuary of Monobe river. 1.VII.2002. M. Sakai leg. 1♀ [EUMJ]; Kami city, Kami-anauchi. 30–31.VII.2016. Kazuhiko Konishi leg. (MT) 1♀ [EUMJ]; Hata dist., Nishi-Tosa vill., Oku-Yanai, Kuroson, 29.IV.1956, Yozo Murakami leg., 2♀ [ELKU]; Fukuoka pref., Fukuoka city, Mt. Tachibana-yama, 14.V.1970. Minoru Miyazaki leg. 3♀ [ELKU]; 13.V.1994. Hiroshi Honda leg. (YPT) 1♀ [ELKU]; 2.VII.1994. Hiroshi Honda leg. (YPT) 5♂ [ELKU]; 16.VII.1994. Hiroshi Honda leg. (YPT) 2♂4♀ [ELKU]; 23.VII.1994. Hiroshi Honda leg. (YPT) 1♂1♀ [ELKU]; 30.VII.1994. Hiroshi Honda leg. (YPT) 1♀ [ELKU]; 7.VIII.1994. Hiroshi Honda leg. (YPT) 1♂1♀ [ELKU]; Fukuoka city, Mt. Abura-yama, 21.VI.1959. Shoichi Miyamoto leg. 1♀ [ELKU]; Fukuoka city, East ward, Tatara. 8.IX.1996. Yoshimitsu Higashiura leg. 1♀ [ELKU]; Fukuoka city, Sawara ward, Mt. Sefuri-san, 1.VIII.1992, Yoshimitsu Higashiura leg. 2♀ [ELKU]; Kasuya dist., Sasaguri town, Mt. Wakasugi-yama. 12.V.1969. Masako Honda leg. 1♀ [ELKU]; 13.V.1970. Masako Honda leg. 1♀ [ELKU]; Dazaifu

city, Kitadani. 5.III.2016. Yu Hisasue leg. 1♀ [ELKU]; Iizuka city, Ae, 33.564°N, 130.640°E, 5.V.2018. Yu Hisasue leg., (collected from blossoms of *Acer palmatum*) 1♀ [ELKU]; Tagawa dist., Soeda town, Mt. Hiko-san. 28.IX.1966, Masako Honda leg. 3♀ [ELKU]; 8.V.1967, Masako Honda leg. 1♀ [ELKU]; 10.V.1967, Masako Honda leg. 2♀ [ELKU]; 20.IV.1967, Kenkichi Kanmiya leg. 1♀ [ELKU]; 20.VI.1967, Kenkichi Kanmiya leg. 1♀ [ELKU]; 20.IX.1967, Kenkichi Kanmiya leg. 3♀ [ELKU]; 25.VII.196–, Kôichi Takeno leg. (MT) 1♂ [ELKU]; 5.VI.1970, Kenkichi Kanmiya leg. 3♀ [ELKU]; 15.IV.1971, Michitaka Chujo leg. 1♀ [ELKU]; 24.VII.1972, Michitaka Chujo leg. 1♀ [ELKU]; 22–26.V.1979, Kaoru Maeto leg. 1♀ [NIAES]; 25–26.VII.1979, Kaoru Maeto leg. 3♂1♀ [NIAES]; 24–26.X.1979, Kaoru Maeto leg. 3♀ [NIAES]; Miyako dist., Saigawa town, Hobashira, Mt. Hiko-san, No-tôge pass. 29.VIII.1993, N. Wasano leg. 1♂ [ELKU]; Saga pref., Kishima dist., Yamauchi town. 22.X.1991. Yoshimitsu Higashiura leg. 2♀ [ELKU]; Higashi-Matsuura dist., Genkai town, Kariya. 23.VIII.1993. Yoshimitsu Higashiura leg. 3♀ [ELKU]; Nagasaki pref., Minami-Takaki dist., Obama town. 25.II.1960. Terunobu Hidaka leg. 1♀ [ELKU]; Kumamoto pref., Hondo city, Nishinoku Lake, 5.VI.1999. Victor Fursov leg. 1♀ [IZAN]; Miyazaki pref., Higashi-Usuki dist., Shiiba vill., Shimo-Fukura, Ohira. 29.VIII.1993, N. Wasano leg. 3♀ [ELKU]; Kagoshima pref., Aira dist., Kirishima town, Taguchi, Kirishima-jingû shrine, 15.VII.1969. Osamu Yata leg. 1♂ [ELKU]; Kimotsuki dist., Sata town, Magome, Tajiri, Kape Sata, 17.VII.1969. Osamu Yata leg. 2♀ [ELKU]; Kumage Dist., Yaku-shima Isl., Yaku town, Kurio, 8.VII.1975. Kenzo Yamagishi leg. 2♂1♀ [ELKU]; Kagoshima Dist., Toshima vill., Tokara Isles., Kuchi-no-shima Isl., 2.V.1993, Hiroshi Honda leg., 2♀ [ELKU]; Satoshi Kamitani leg., 2♀ [ELKU]; Ôshima dist., Amami-ôshima Isl., Uken vill., Mt. Yuwan-dake, 30.VII.1963, J. L. Gressitt leg. 1♂1♀ [ELKU]; Okinawa pref., Okinawa Isl., Nago city, Mt. Nago-dake, 26.587°N, 128.000°E, 140 m, 3–14.VII.2016, Keisuke Narita leg. 1♀ [ELKU]; Tokyo Met., Hachijo Isl., Hachijo town, Kamogawa. 27.V.1964, Y. Hirashima and M. Shiga leg. 3♀ [ELKU]; Hachijo town, Mitsune-Kantoyama. 30.V.1964, Y. Hirashima and M. Shiga leg. 1♀ [ELKU]; Fukuoka pref., Munakata dist., Munakata town, Chikuzen Oki-no-shima Isl. 25–28.VII.1958, Yoshihiro Hirashima, Yozo Murakami and Yorio Miyatake leg. 1♂ [ELKU].

Distribution. Japan (Hokkaido; Honshu: Fukushima, Ibaraki, Tochigi, Niigata, Ishikawa, Gifu, Shizuoka, Aichi, Osaka, Wakayama, and Shimane; Shikoku: Tokushima, Ehime, and Kochi; Kyushu: Fukuoka, Saga, Nagasaki, Kumamoto, Miyazaki, and Kagoshima; Ryukyus: Yaku-shima Isl., Naka-no-shima Isl., Amami-ôhshima Isl., and Okinawa Isl.; Hachijo Isl; and Chikuzen Oki-no-shima Isl.)

Remarks. Among Japanese species, *G. yamagishii* is similar to *G. japonicum* and *G. fulvicoxa*, but *G. yamagishii* differs from these species in the sculpture of the antennal depression (*G. yamagishii* (Fig. 3C): transversely costate by strong regular carinae; *G. fulvicoxa* (Fig. 3A) and *G. japonicum* (Fig. 3B): transversely costate by strong irregular carinae) and the presence of the short sharp horn on the angular point of occipital carina (Fig. 4C). Russian Far Eastern species, *G. amissum* Kozlov & Kononova, 1990 and *G. sibiricum* Kononova, 2001 are also similar to *G. yamagishii* in the sculpture of

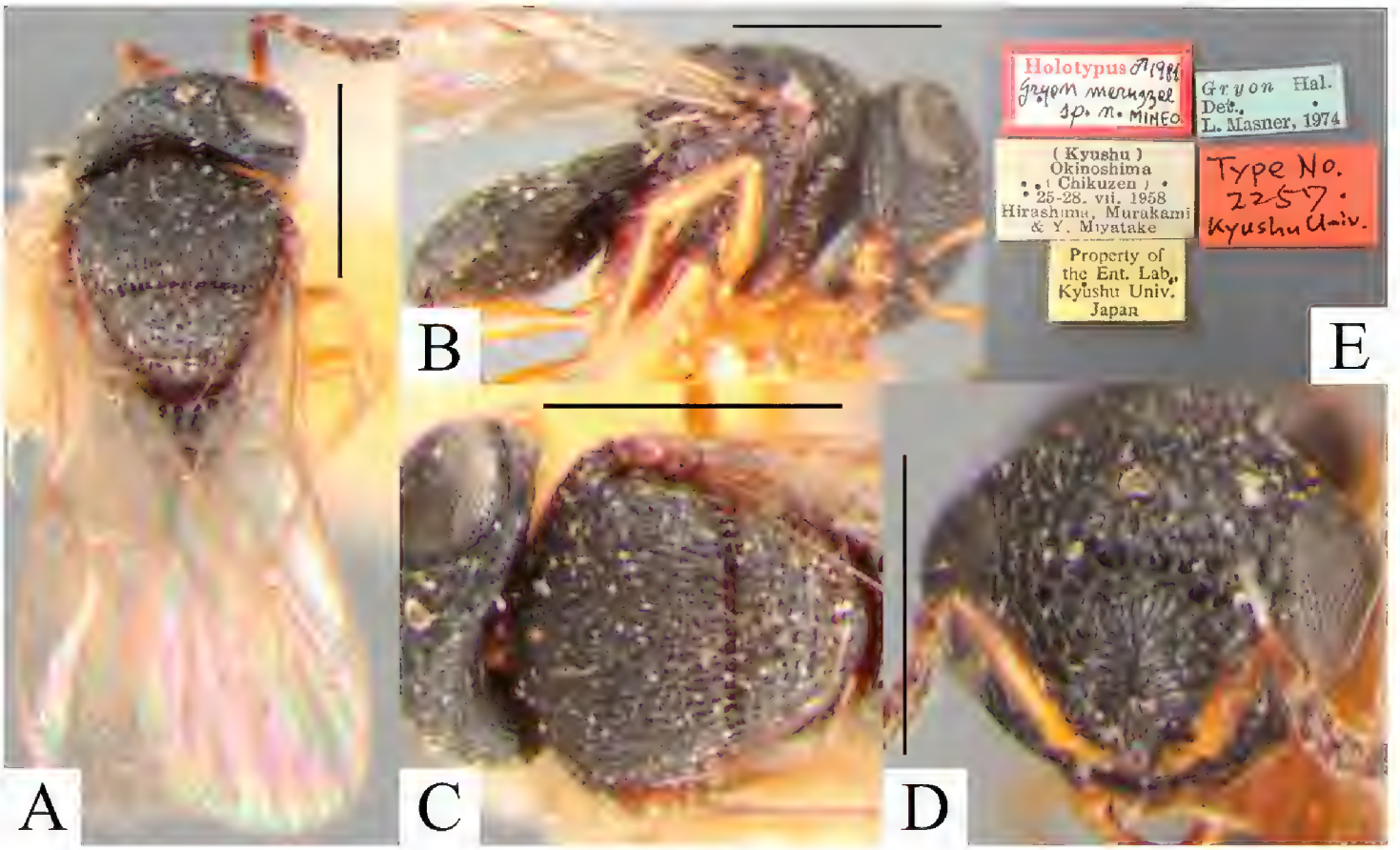

Figure 11. The holotype of *G. maruzzae* syn. nov. **A** dorsal view **B** lateral view **C** mesosoma, dorsal view **D** frons **E** labels.

the frons. In *G. amissum* and *G. sibiricum*, however, the angular points of occipital carina are not developed as horns, and the mesopleural carina is weak (*G. amissum*) or absent (*G. sibiricum*). We examined the holotype of *G. maruzzae* at ELKU (Fig. 11) and *G. sugonjaevi* at ZIN, and they belong to *G. yamagishii*.

Gryon charon-group (Mineo, 1983)

Diagnosis. Frons reticulate with setae; frontal depression developed with enclosing strong carina. Clypeus almost rounded. Eyes with sparse setae or without. Occipital carina complete, angular point of occipital carina developed; postoccipital carina present, at least laterally; medial genal carina present; postgena weakly almost smooth; postgenal pit located near fossa.

Gryon philippinense (Ashmead, 1904)

Figs 1D, 2D, 3D, 4D, 5D, J, 6D, 7C, D, 8C, D, 9C, D

Hadronotus philippinensis Ashmead, 1904a: Ashmead 1904c; Kieffer 1926; Baltazar 1966. *Gryon philippinensis* (Ashmead): Masner and Muesebeck 1968. *Gryon philippinense* (Ashmead): Mineo 1983; Mineo 1990b; Johnson 1992; Lê 2000; Dasilao and Arakawa 2004, 2005; Nakajima and Fujisaki 2010; Nakajima et al. 2012.

Hadronotus hakonensis Ashmead, 1904b: Kieffer 1926; Watanabe 1951. *Gryon hakonensis* (Ashmead): Masner and Muesebeck 1968. *Gryon hakonense* (Ashmead): Mineo 1981; Johnson 1992; Kononova and Kozlov 2008. syn. nov.

Hadronotus homoeoceri Nixon, 1934: Mineo 1979 (syn.). *Hadronotus homoceri* Nixon: Mani 1941. *Gryon homoeoceri* (Nixon): Masner 1965; Mani and Sharma 1982; Sharma 1982; Johnson 1992.

Diagnosis. Horizontal portion of occipital carina short, reaching longitudinal extension line of outer margin of lateral ocelli or shorter. Postgena almost smooth, longitudinally costate by weak furrows along postoccipital carina; postgenal sulcus curved toward hypostoma; postgenal bridge smooth, weakly punctate-costate beside of median sulcus.

Description. Female. Length = 1.2–1.7 mm.

Color. (Figs 1D, 2D). ***Body*** mainly black. A1–6, mandibles, and legs (excluding coxae) yellow.

Head. FCI = 1.05–1.18; LCI = 1.53–1.71; DCI = 1.69–1.98; HW/IOS = 1.78–1.87; head about 1.3 times as wide as mesosoma (HW/TSL = 1.20–1.29). Frons (Fig. 3D) reticulate with setae; central carina weakly present in lower half of frontal depression, absent in upper half of frontal depression, present between enclosing carina of frontal depression and anterior ocellus, frontal depression weakly developed, with enclosing carina; antennal depression width about 1.8 times wider than distance between eye and antennal depression (WAD/OAD = 1.61–2.32). Vertex reticulate with setae; interocellar space reticulate-granulate; hyperoccipital carina present; POL about 5.7 times as long as OOL (POL/OOL = 5.04–6.02); OOL about 0.3 times as long as LOL (OOL/LOL = 0.27–0.38). Clypeus rectangular, with rounded corners. Gena coriaceous with setae; medial genal carina present. Occiput (Fig. 4D) transversely semi-elliptically costate, with setae; occipital carina complete; angular point of occipital carina developed; horizontal portion of occipital carina short, reaching longitudinal extension line of outer margin of lateral ocelli or shorter; postoccipital carina present, weak mesad; postgena almost smooth, longitudinally costate by weak furrows along postoccipital carina; postgenal sulcus curved toward hypostoma; postgenal bridge smooth, weakly punctate-costate beside median sulcus. Antennae (Fig. 5D) clavate; A1 about three times longer than radicle, as long as clava; clava with six segments; claval sensilla formula A7–12/1–2–2–2–2–1; claval length about 4.8 times longer than width. Mandibles thin, tridentate, anterior tooth longer than other teeth.

Mesosoma. Cervical pronotal area (Fig. 8C) granulate dorsad, smooth-imbricate ventrad, with dense setae; epomial carina strongly present, reaching dorsal edge; pronotal suprahumeral sulcus foveolate with setae, unclear mesad; lateral pronotal area rugulose dorsad, smooth with transverse dense carina ventrad. Propleuron weakly transversely costate. Mesoscutum (Fig. 7C) about 1.4 times as wide as long (TSL/ML = 1.33–1.45) reticulate, inside of cell coriaceous, with setae; parascutal carina absent; notaulus absent. Mesoscutellum about 1.8 times as wide as long (SW/SL = 1.65–1.86), reticulate, inside of cell coriaceous, with setae, slightly produced posteriorly. Mesopleuron (Fig. 7D)

c***ostate-***reticulate above mesopleural canina, reticulate with setae below mesopleural canina; prespecular and upper mesepisternal sulci foveolate; prespecular sulcus with setae; mesopleural carina strongly present; postacetabular sulcus foveolate. Metascutellum (Fig. 8D) weakly produced, rugose. Metapleuron (Fig. 7D) foveolate anteriorly, glanulate with dense setae posteriorly, with longitudinal carina modified as weak redge; anterior part of metapleural sulcus and upper paracoxal sulcus with setae. Propodeum foveolate, with setae laterad. Fore wing (Fig. 6D); stigmal vein about 3 times longer than marginal vein; postmarginal vein about 4.9 times longer than marginal vein.

Metasoma. T1 (Fig. 9C) longitudinally striate, setose laterally. S1 (Fig. 9D) longitudinally striate. T2 reticulate, with setae laterally. S2 reticulate-granulate, with setae. T3 reticulate with setae. S3–6 punctate with setae. T4 reticulate-rugose with setae. T5–6 rugose with setae.

Male. Almost same as female, but antennae (Fig. 7J) filiform; A1 yellow, A2–11 brown.

Variation. The sculpture of frons and postgena of the small specimens is weaker than that of the large specimens. In the smallest specimens collected in Kôchi University, the sculpture of the frons is reticulate-granulate with puncture and the sculpture of postgena is barely costate. In contrast, the sculpture of the frons in the larger specimens is clearly reticulate, and that of the postgena is also clear. The number of sulci is large in large specimens. The pronotal cervical sulcus is weakly foveolate in the large specimens, however, the foveolae are lacking in small specimens. Owing the smaller host egg size, specimens that emerge from *A. soridius* are smaller and the sculpture is weaker than those that emerge from the larger eggs of *H. unipunctatus*.

Host. Coreidae: *Acanthocoris sordidus*, *Homoeocerus marginellus* (Herrich-Schäffer, 1840), *H. unipunctatus* (Thunberg, 1783) new record; and *Leptoglossus membranaceus* (Fabricius, 1781). Watanabe (1951) also recorded *Homoeocerus marginiventris* Dohrn, 1860 (Coreidae) and *Riptortus pedestris* (Alydidae), but the identification of wasps is problematic (see remarks).

Biology. Females of *G. philippinense* are found in the "Komomaki", rice straw belts wrapped around trees during winter. Some females are also found on the underside of leaves of evergreen broad-leaved trees. In spring, females can be collected from blossoms of *Acer palmatum* Thunberg (Sapindaceae).

Material examined. Ibaraki pref., Tsukuba city, near Mt. Tsukuba-san, 13.IX.1984, Takashi Noda leg., emergence from eggs of *Acanthocoris sordidus* on pod of soybeans, 2♂8♀ [ELKU]; Niigata pref., Nagaoka city, Urase-machi, 37.464°N, 138.907°E, alt. 40 m. 25. VII–7.VIII.2015, Ryo Shimizu and So Shimizu leg. (MT), 1♀ [ELKU]; 23. VI–13.VII.2016, (MT), 1♀ [ELKU]; 13. VII–1.VIII.2016, (MT), 1♀ [ELKU]; Wakayama pref., Nishi-Muro dist., Shirahama town, Tonda-cho, 13.IX.1984, Takashi Noda leg., emergence from eggs of *Acanthocoris sordidus*, 2♂9♀ [ELKU]; Yamaguchi pref., Yamaguchi city, Ôuchi-Nagano. 34.167°N, 131.523°E. 29.XI.2014. Yoshimitsu Higashiura leg. 1♀ [ELKU]; Ehime pref., Matsuyama city, Tarumi, Ehime University, 23.I.2016. Yu Hisasue leg., (collected from Komomaki) 2♀ [ELKU]; 15–16.IV.2016, 2♀ (YPT) [ELKU]; Kita dist., Uchiko town, Hongawa, Hirose shrine. 27.V.2014.

Eiji Yamamoto leg. 1♀ [EUMJ]; 1.III.2017. Hiroyuki Yoshitomi leg. (collected from back of the leaves of *Quercus gilva*) 10♀ [EUMJ]; Kôchi pref., Hata dist., Nishi-Tosa vill., Oku-Yanai, Kuroson, 29.IV.1956., Yozo Murakami leg., 2♀ [ELKU]; Nankoku city, Kôchi University, Ryo Arakawa leg., emergence from eggs of *Acanthocoris sordidus*, 7♂14♀ [ELKU]; Fukuoka pref., Tagawa dist., Soeda town, Ochiai, Kajiya, 24.VIII.1972, Michitaka Chujo leg., 2♀ [ELKU]; 12.IX.1972, 1♀ [ELKU]; 5.X.1972, 1♀ [ELKU]; Tagawa dist., Soeda town, Mt. Hiko-san, Kaoru Maeto leg., 24–26.X.1979, 1♀ [NIAES]; Fukuoka city, Sawara ward, Ishigama, 6.V.2014, Taisuke Kawano leg., 1♀ [ELKU]; Yanagawa city, Shin'hokamachi, 33.158°N, 130.399°E, 12.III.2016, Yu Hisasue leg., (sweeping of trees) 1♀ [ELKU]; Kasuya dist., Hisayama town, Ino, 10.IV.2018, Taisuke Kawano leg., (collected from blossoms of *Acer palmatum*) 1♀ [ELKU]; Iizuka city, Ae, 33.564°N, 130.640°E, 5.V.2018. Yu Hisasue leg., (collected from blossoms of *Acer palmatum*) 2♀ [ELKU]; Kumamoto pref., Hondo city, Jôshita, 22.VII.1996. Hiroshi Honda leg., (emergence from eggs of *Acanthocoris sordidus*) 2♀ [ELKU]; Kagoshima pref., Kimotsuki dist., Sata town, Magome, Tajiri, Kape Sata, 17.VII.1969, Minoru Miyazaki leg. 1♀ [ELKU]; Kagoshima city, 18.VII.1969, Osamu Yata leg. 1♀ [ELKU]; Kagoshima City, Mt. Taga-yama, 1.VI.1987, Yoshimi Hirose leg. (emergence from egg of *Homoeocerus unipunctatus* on *Pueraria montana* var. *lobata*) 1♂1♀ [ELKU]; Hioki dist., Ijûin town, 1.VI.1987, Yoshimi Hirose leg. (emergence from egg of *Homoeocerus unipunctatus* on *Pueraria montana* var. *lobata*) 2♂7♀ [ELKU]; Kumage Dist., Yaku-shima Isl., Yaku town, Kurio, 8.VII.1975. Kenzo Yamagishi leg. 2♂2♀ [ELKU]; Kagoshima Dist., Toshima vill., Tokara Isles., Kuchino-shima Isl., 2.V.1993, Hiroshi Honda leg., 2♀ [ELKU]; Ôshima dist., Amami-ôshima Isl., Tatsugo town, Ankiyaba, 22.V.2002, Kenji Fujisaki leg., (emergence from egg of *Acanthocoris sordidus*) 18♂13♀ [ELKU]; Okinawa pref., Okinawa Isl., Kunigami dist., Motobu town, Izumi. 21.X.1963, Yoshihiro Hirashima leg. 1♀ [ELKU]; Ôgimi vill., Ôgimi, 27.VII.1995, Yoshimitsu Higashiura leg. (emergence from coerid egg on papaya) 7♂5♀ [ELKU]; Nago city, Mt. Nago-dake, 26.587°N, 128.000°E, 140 m, 3–14.VII.2016, Keisuke Narita leg. 1♀ [ELKU]; Miyako Isl., Miyako-jima city, Ueno, Mt. Nobaru-dake, 27.XII.2017, Hiraku Yoshitake leg. 1♀ [ELKU]; 29.XII.2017, 1♀ [ELKU]; Miyako-jima city, Hirara, Ôno-sanrin, near Miyako-seishônen-no-ie, 29.XII.2017, Hiraku Yoshitake leg. 6♀ [ELKU]; Ishigaki Isl., Ishigaki city, Kawara-dake, 28.X.1963, Yoshihiro Hirashima leg. 1♀ [ELKU]; Yaeyama dist. Iriomote Isl., Taketomi town, Ôhara-komi, 17.VII.1963, Yorio Miyatake leg., 1♀ [ELKU]; Taketomi town, Ôtomi, 15–23.III.1995, Takeshi Matsuura leg. 1♀ [NIAES]; Nagasaki pref., Tsushima Isl., Shimo-Agata dist., Izuhara town, Mt. Tatera, 27.IX.1959, 1♀ [ELKU] (with identification label; *Gryon hakonensis* (Ashm.) det. G. Mineo, 1978).

Distribution. Japan (Honshu: Ibaraki, Niigata, Wakayama, and Yamaguchi; Shikoku: Ehime and Kôchi; Kyushu: Fukuoka, Saga, Kumamoto, and Kagoshima; Ryukyus: Yaku-shima Isl., Naka-no-shima Isl., Amami-ôhshima Isl., Okinawa Isl., Miyako Isl., Ishigaki Isl., and Iriomote Isl.; Tsushima Is.), South Korea (North Gyeongsang: Mt. Sudosan) Philippines (Luzon Isl.: Manila), Indonesia (Java Isl.: Bogor), India (Kerala), Vietnam (Ho Chi Minh City).

Remarks. Among the *charon*-group species, *G. philippinense* differs from other species in the sculpture of the median sulcus of the postgenal bridge (Fig. 4D). Talamas et al. (2017) provided some pictures of holotypes of *G. philippinense* and *G. hakonense*. Also, we examined the voucher specimen of Mineo (1979) deposited in ELKU. Based on these pictures and the voucher specimens, *G. hakonense* is a junior synonym of *G. philippinense*. Watanabe (1951) redescribed *G. hakonense* based on specimens that emerged from eggs of *Homoeocerus marginiventris* and *Riptortus pedestris*. We could not, however, find the voucher specimens in SEHU and the redescription is insufficient to identify the species properly, therefore, we excluded the two host records.

***Gryon shisa* Komeda & Mita, sp. nov.**

http://zoobank.org/45003564-D0AB-4E7B-A91A-E6495DE3ADB1

Figs 1E, 2E, 3E, 4E, 5E, K, 7E

Diagnosis. Horizontal portion of occipital carina curved, reaching central longitudinal line of lateral ocelli. Postgena smooth; postgenal sulcus straight; postgenal bridge smooth.

Description. Female. Length = 1.6–1.7 mm.

Color. (Figs 1E, 2E). ***Body*** mainly black. Mandibles brown. A1–6 and legs (excluding coxae) yellow.

Head. FCI = 1.15–1.22; LCI = 1.51–1.62; DCI = 1.75–1.88; HW/IOS = 1.88–2.14; head about 1.2 times as wide as mesosoma (HW/TSL = 1.10–1.19). Frons reticulate with setae, with transverse carina between eye and frontal depression; central carina weakly present in lower half of frontal depression, absent in upper half of frontal depression, present between enclosing carina of frontal depression and anterior ocellus; frontal depression weakly developed, with enclosing carina; antennal depression about 1.3 times wider than distance between eye and antennal depression (WAD/OAD = 1.19–1.40). Vertex reticulate with setae; interocellar space reticulate-granulate; hyperoccipital carina present; POL about six times as long as OOL (POL/OOL = 5.54–6.55); OOL about 0.3 times as long as LOL (OOL/LOL = 0.26–0.32). Clypeus trapezoidal, with rounded corners. Gena coriaceous with setae; medial genal carina present. Occiput transversely semi-elliptically costate, with setae; occipital carina complete; angular point of occipital carina developed; horizontal portion of occipital carina curved, reaching central longitudinal line of lateral ocelli; postoccipital carina present laterally; postgena smooth; postgenal sulcus straight; postgenal bridge smooth. Antennae (Fig. 5E) clavate; A1 about 4.8 times longer than radicle, about 1.2 times longer than clava; clava with six segments; claval sensilla formula A7–12/1–2–2–2–2–1; claval length about 4.1 times longer than width. Mandibles thin, tridentate, anterior tooth longer than other teeth.

Mesosoma. Cervical pronotal area costate dorsad, smooth-imbricate ventrad, with sparse setae; epomial carina strongly present, not reaching dorsal edge; pronotal suprahumeral sulcus foveolate with setae, unclear mesad; lateral pronotal area with transverse dense carina; pronotal cervical sulcus foveolete. Propleuron weakly

transversely costate. Mesoscutum about 1.5 times as wide as long (TSL/ML = 1.44–1.61), reticulate; parascutal carina absent; notaulus absent. Mesoscutellum about 2.1 times as wide as long (SW/SL = 1.84–2.22), reticulate with setae, slightly produced posteriorly. Mesopleuron mesopleuron costate-reticulate above mesopleural canina, reticulate with setae below mesopleural canina; prespecular and upper mesepisternal sulci foveolate; prespecular sulcus with setae; mesopleural carina strongly present; postacetabular sulcus foveolate. Metascutellum weakly produced, striate. Metapleuron foveolate anteriorly, rugulose with dense setae posteriorly, with longitudinal irregular carina; anterior part of metapleural sulcus and upper paracoxal sulcus with setae. Propodeum foveolate, with setae laterad. Fore wing (Fig. 7E); stigmal vein about four times longer than marginal vein; postmarginal vein about 7.3 times longer than marginal vein.

Metasoma. T1 longitudinally striate, setose laterally. S1 longitudinally striate. T2 reticulate with setae laterally. S2 reticulate-granulate, with setae. T3 reticulate with setae. T4 reticulate-rugose with setae. T5–6 rugose with setae. S3–6 punctate with setae

Male. Almost same as female, but antennae (Fig. 5K) filiform; A1–11 yellow.

Host. Coreidae: *Paradasynus spinosus* Hsiao, 1963.

Material examined. ***Holotype*:** Okinawa pref., Okinawa Isl., Kunigami Dist., Ôgimi vill., Janagusuku. 30.VII.2002, Yasutsune Sadoyama leg. (emergence from an egg of *Paradasynus spinosus*) 1♀ [ELKU]. ***Paratypes.*** Same data as holotype. 3♂7♀ [ELKU].

Distribution. Japan (Ryukyus; Okinawa Is.)

Etymology. The species name refers to Shīsā, the Okinawan traditional statue of the guardian lion, because this species defends the shequasar (*Citrus* × *depressa* Hayata), a kind of citrus fruit, from the important pest (*Paradasynus spinosus*) on Okinawa Island. (Zukeyama et al. 2007).

Remarks. Among the species of the *charon*-group, *G. shisa* is the only species without sculpture on the postgena, except for the postgenal sulcus (Fig. 4E). This species also differs from *G. philippinense* in the shape and length of the postgenal sulcus (*G. shisa* (Fig. 4E): straight; *G. philippinense* (Fig. 4D): curved toward hypostoma) and the length of horizontal portion of occipital carina (*G. shisa* (Fig. 4E): long, reaching central longitudinal line of lateral ocelli; *G. philippinense* (Fig. 4D): short, reaching longitudinal extension line of outer margin of lateral ocelli or shorter). Among Vietnamese species, four species, *G. ancinla* Kozlov & Lê, 1996, *G. clavaerus* Kozlov & Lê, 1996, *G. drunoris* Kozlov & Lê, 1996, and *G. sponus* Kozlov & Lê, 1996 seem to belong to *charon* group, but their horizontal portions of occipital carinae is also short like *G. philippinense*.

Gryon floridanum-group (Masner, 1983)

Diagnosis. Frons reticulate with setae; Clypeus almost rounded. Eyes without setae. Occipital carina complete, horizontal part of occipital carina well-developed, each

arms fused; postoccipital carina well-developed, subparallel under horizontal part of occipital carina; medial genal carina absent; postgenal pit located near fossa.

Gryon pennsylvanicum Ashmead, 1893

Figs 1F, 2F, 3F, 4F, 5F, L, 6F, 7E, F, 8E, F, 9E, F

Telenomus pennsylvanicus Ashmead, 1983: *Hadronotus pennsylvanicus* (Ashmead): Kieffer 1926: *Gryon pennsylvanicus* (Ashmead): Masner 1961: *Gryon pennsylvanicum* (Ashmead): Masner 1983b; Mineo and Caleca (1987a); Yasuda 1990; Yasuda and Tsurumachi 1995; Kononova and Kozlov 2008.

Hadronotus ajax Girault, 1920: *Gryon ajax* (Girault): Muesebeck and Masner in Krombein and Burks 1967; Masner and Muesebeck 1968; Mineo 1980a; Masner 1983 (syn.); Johnson 1992.

Hadronotus atriscapus Gahan, 1927: *Gryon atriscapus* (Gahan): Muesebeck and Masner in Krombein and Burks 1967; Masner and Muesebeck 1968; Mineo 1980a (syn.); Masner 1983; Johnson 1992.

Gryon sp. affinis *pennsylvanicum* (Ashmead): Mineo 1990b.

Diagnosis. Horizontal part of occipital carina well-developed, curved mesad. Postoccipital carina weakly curved.

Description. Female. Length 1.6–1.8 mm.

Color. (Figs 1F, 2F). ***Body*** mainly black. A1–6, and legs (excluding coxae) yellow.

Head. FCI = 1.23–1.32; LCI = 1.46–1.65; DCI = 1.87–2.13; HW/IOS = 1.90–1.94; head about 1.3 times as wide as mesosoma (HW/TSL = 1.22–1.32). Frons (Fig. 3F) reticulate, setose, with transverse carina above frontal depression; central carina absent; frontal depression developed, transversely costate by weak irregular carinae. Vertex reticulate; interocellar space reticulate; hyperoccipital carina present; POL about seven times as long as OOL (POL/OOL = 6.59–7.73); OOL about 0.2 times as long as LOL (OOL/LOL = 0.22–0.26). Clypeus rectangular, with rounded corners. Gena reticulate, inside of cell coriaceous, with setae; medial genal carina absent. Occiput (Fig. 4F) transversely costate with setae; occipital carina complete, with angular point; horizontal portion of occipital carina well-developed, curved mesad, straight laterad, each arms fused; postoccipital carina well-developed, weakly curved, reaching fossa; postgena weakly striate longitudinally; postgenal sulcus straight; postgenal bridge smooth, weakly curvedly costate beside median sulcus. Antennae (Fig. 5F) clavate; A1 about 6.4 times longer than radicle, as long as clava; clava with five segments; claval sensilla formula A8–12/2–2–2–2–1; claval length about 3.9 times longer than width. Mandibles tridentate, anterior tooth longer than other teeth.

Mesosoma. Cervical pronotal area (Fig. 8E) smooth-imbricate; epomial carina strongly present, as redge; pronotal suprahumeral sulcus foveolate with setae; lateral

p***ronotal*** area narrow, smooth with transverse dense carina; pronotal cervical sulcus foveolete. Propleuron weakly imbricate. Mesoscutum (Fig. 7E) about 1.5 times as wide as long (TSL/ML = 1.45–1.59), with dense setae, reticulate-rugose; parascutal carina absent; notaulus absent. Mesoscutellum about 1.6 times as wide as long (SW/SL = 1.49–1.66), reticulate, with dense setae. Mesopleuron (Fig. 7F) **cost**ate above mesopleural canina, rugulose with sparse setae below mesopleural canina; prespecular and upper mesepisternal sulci foveolate; prespecular sulcus with setae; mesopleural carina present; postacetabular sulcus weakly foveolate. Metascutellum (Fig. 8F) weakly produced, longitudinally striate. Metapleuron randomly foveolate; anterior part of metapleural sulcus and posterodorsal metapleural sulcus with setae. Propodeum foveolate-rugulose. Fore wing (Fig. 6F): stigmal vein about 2.3 times longer than marginal vein; postmarginal vein about 4.3 times longer than marginal vein.

Metasoma. T1 (Fig. 9E) longitudinally striate, setose laterally. S1 (Fig. 9F) longitudinally striate. T2 longitudinally striate anteriorly, reticulate posteriorly, setose laterally. S2 with setae, granulate-punctate mesad, striate laterad. T3 reticulate, with setae laterad and posteriorly. S3–5 punctate with setae. T4 punctate-striate with setae. T5–6 punctate with setae. S6 smooth with setae.

Male. Almost same as female, but antennae (Fig. 5L) filiform; A1–11 yellow.

Host. Coreidae: *Anasa tristis* (De Geer, 1773), *Narnia femorata* Stål, 1862, *Leptoglossus corculus* (Say, 1832), *L. fulvicornis* (Westwood, 1842), *L. gonagra* (Fabricius, 1775) new record, *L. phyllopus* (Linnaeus, 1767), *L. occidentalis* Heidemann, 1910, *Chelinidea* sp.

Material examined. Okinawa pref., Ishigaki Isl., Ishigaki city, Maesato. 17.VII.1989. Koji Yasuda leg. emerged from an egg of *Leptoglossus gonagra* on 2.VIII.1989. 8♂38♀ [ELKU]. 1♂4♀ [IZAN].

Distribution. Japan (Ryukyus: Ishigaki Isl.): Canada (British Columbia), Italy (Tuscany: introduced), USA (Alabama, Arizona, Arkansas, California, Columbia D.C., Florida, Georgia, Louisiana, Maryland, Missouri, North Carolina, Pennsylvania (?), South Carolina, Tennessee, Texas), tropical areas of New World include Colombia, Dominican Republic, Brazil.

Remarks. Before this study, the known destribution of *G. pensylvanicum* covered the Eastern, Midwest, Western and Southern USA, British Colombia, tropical areas of the New World (Masner 1983) and the Northern Italy (introduced as a natural enemy of *Leptoglossus occidentalis* Heidemann, 1910: Roversi et al. 2011). These localities are very far from Ishigaki Island. Hayashi and Kogure (2013) recorded *Xyphon reticulatum* (Signoret, 1854), a leafhopper originally distributed in the Southern Nearctic and the Northern Neotropical regions (Catanach et al. 2013), from the Southern Ryukyus including Ishigaki Island. This leafhopper is considered to introduced with some poaceous pastures (Hayashi and Kogure 2013). Japanese *G. pennsylvanicum* could have been accidentaly introduced from the New World as well as *X. reticulatum*.

Key to species of Japanese *muscaeforme*-group of *Gryon*

1 Sculpture of frontal depression (Fig. 3A, B) irregular. Angular point of occipital carina (Fig. 4A, B) weakly projected **2**

– Sculpture of frontal depression regular (Fig. 3C). Angular point of occipital carina (Fig. 4C) modified as short sharp horn; horizontal portion of occipital carina straight, expanding inwardly..... ***G. yamagishii* Mineo, 1981**

2 Horizontal portion of occipital carina (Fig. 3A) curved, reaching longitudinal extension line of inner margin of lateral ocelli. Coxae (Fig. 2A) brown-black, same as body..... ***G. japonicum* (Ashmead, 1904)**

– Horizontal portion of occipital carina (Fig. 3B) straight, short, reaching longitudinal extension line of outer margin of lateral ocelli. Legs (including coxae yellow (Fig. 2A), same as other parts of legs..... ***G. fulvicoxa* sp. nov.**

Key to species of Japanese *charon*-group of *Gryon*

1 Horizontal portion of occipital carina (Figs 1D, 4D) short, reaching longitudinal extension line of outer margin of lateral ocelli or shorter. Postgena (Fig. 4D) almost smooth, longitudinally castate by weak furrows along postoccipital carina; postgenal sulcus curved toward hypostoma .... ***G. philippinense* (Ashmead, 1904)**

– Horizontal portion of occipital carina (Figs 1E, 4E) curved, reaching central longitudinal line of lateral ocelli. Postgena (Fig. 4E) smooth; postgenal sulcus straight; postgenal bridge smooth ..... ***G. shisa* sp. nov.**

Discussion

Mineo (1981) established the *muscaeforme*-group based on the body sculpturing, the form and sculpturing of the frontal depression and mesosoma, and the form of the carinae on the occiput. Kononova and Kozlov (2008) provided another concept for the *muscaeforme*-group based on the presence of the hyperoccipital carina. As a result of our study, however, some members of *muscaeforme*-group sensu Kozlov and Kononova (*G. misha* (synonymized with *G. japonicum*), *G. japonicum*, and *G. yamagishii*) do not have the hyperoccipital carina. Species group concepts by Mineo are based on multiple well-defined characters, therefore, at least for the Palearctic species, the concept by Mineo is more practical.

While the hosts of some species are known, the life history of most Scelionidae in the field is unknown. Some specimens examined in this study were collected in winter. They were collected from under the bark of *Zelkova serrata* (Fig. 12), in the "Komomaki" (see above), and the underside of leaves of evergreen broad-leaved trees. Also, sometimes they showed overwintering aggregation with other species of Scelionidae such as *Trissolcus corai* Talamas, 2017, *T. cultratus* (Mayr, 1879), *T. gonopsidis*

Figure 12. Overwintering aggregation of *Gryon* and *Trissolcus* under the bark of *Zelkova serrata* in Akita prefecture (provided by J. Kobayashi).

(Watanabe, 1951), *T. japonicus* (Ashmead, 1904), *T. plautiae* (Watanabe, 1954), *Idris* sp., *Psilanteris* sp., and *Telenomus* sp. Therefore, natural cracks such as narrow slit under the bark or artificially created cracks such as "Komomaki" and corrugated fiberboards could provide suitable winter habitat for not only predators (Fye 1985; Togashi et al. 1988; Yoshimura et al. 1995; Korenko and Pekár 2010; Band Trap research group of Abiko Bird Museum 2012) but also parasitoids. In spring, some females collected from maple blossoms. Nectar of small blossoms could work as one of important energy sources for adults in this season. Further investigation on their life cycles is required to understand and enhance their functions as natural enemies.

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References

Ashmead WH (1893) A monograph of the North American Proctotrypidae. Bulletin of the United States National Museum 45: 1–472. https://doi.org/10.5479/si.03629236.45.1

Ashmead WH (1904a) A list of the Hymenoptera of the Philippine Islands, with descriptions of new species. Journal of the New York Entomological Society 12: 1–22.

Ashmead WH (1904b) Descriptions of new Hymenoptera from Japan – I. Journal of the New York Entomological Society 12: 65–84.

Ashmead WH (1904c) Descriptions of new genera and species of Hymenoptera from the Philippine Islands. Proceedings of the United States National Museum 28: 127–158. https://doi.org/10.5479/si.00963801.28-1387.127

Ashmead WH (1905) New genera and species of Hymenoptera from the Philippines. Proceedings of the United States National Museum 29: 397–413. https://doi.org/10.5479/si.00963801.29-1424.397

Baltazar CR (1966) A Catalogue of Philippine Hymenoptera (With a Bibliography, 1758–1963). Pacific Insects Monographs 8: 1–488.

Band trap research group of Abiko Bird Museum (2012) Report of wintering insects, spiders and other small creatures which captured by the Band Traps on trees lining along the shore of Teganuma. Bulletin of Abiko City Museum of Birds 18(3): 1–10. https://www.city.abiko.chiba.jp/bird-mus/info2/list.files/2012.2.Vol.18-3.pdf

Catanach TA, Dietrich CH, Woolley JB (2013) A revision of the New World sharpshooter genus *Xyphon* Hamilton (Hemiptera: Cicadellidae: Cicadellinae). Zootaxa 3741(4): 490–510. https://doi.org/10.11646/zootaxa.3741.4.3

Dasilao AO, Arakawa R (2004) Reproductive capacity and host handling behavior of *Gryon philippinense* (Ashmead) (Hymenoptera: Scelionidae), a solitary egg parasitoid of the winter cherry bug, *Acanthocoris sordidus* Thunberg (Hemiptera: Coreidae). Applied Entomology and Zoology 39(2): 263–269. https://doi.org/10.1303/aez.2004.263

Dasilao AO, Arakawa R (2005) Release effect of an egg Parasitoid, *Gryon philippinense* (Ashmead) (Hymenoptera: Scelionidae), for suppression of the winter Cherry Bug, *Acanthocoris sordidus* Thunberg (Hemiptera: Coreidae), in Greenhouse. Applied Entomology and Zoology 40(3): 387–390. https://doi.org/10.1303/aez.2005.387

Dodd AP (1913) Australian Hymenoptera Proctotrypoidea. No. 1. Transactions of the Royal Society of South Australia 37: 130–181.

Dodd AP (1914) Australian Hymenoptera Proctotrypoidea. No. 2. Transactions of the Royal Society of South Australia 38: 58–131.

Dodd AP (1915) Notes and corrections on Australian Prototrypoidea, with descriptions of forty-five new species. Archiv für Naturgeschichte 80(9): 1–32.

Eady RD (1968) Some illustrations of microsculpture in the Hymenoptera. Proceedings of the Royal Entomological Society of London Series A 43: 66–72. https://doi.org/10.1111/j.1365-3032.1968.tb01029.x

Fye RE (1985) Corrugated fiberboard traps for predators overwintering in pear orchards. Journal of Economic Entomology 78(6): 1511–1514. https://doi.org/10.1093/jee/78.6.1511

Galloway ID (1976) The types of Australian species of the subfamily Scelioninae (Hymenoptera: Scelionidae). Queensland Journal of Agricultural and Animal Sciences 33(1): 83–114.

Girault AA (1920) New serphidoid, cynipoid and chalcidoid Hymenoptera. Proceeding of the United States National Museum 28: 177–216. https://doi.org/10.5479/si.00963801.2332.177

Haliday AH (1833) An essay on the classification of the Parasitic Hymenoptera of Britain, which correspond with the Ichneumones minuti of Linnaeus. Entomological Magazine 1: 259–276.

Harris RA (1979) A Glossary of surface sculpturing. Occasional Papers in Entomology, State of California Department of Food and Agriculture 28: 1–33.

Hayashi M, Kogure K (2013) New record of Leafhoppers (Hemiptera, Cicad*ellidae) from Ja*-*pa*n. Japanese Journal of Systematic Entomology 19(2): 367–372.

Higuchi H, Nakamori H, Mizutani N (1999) Egg parasitoids of bean bug, Riptortus linearis (Fabricius) (Heteroptera, Alydidae) in Okinawa Island. Japanese Journal of Applied Entomology and Zoology 43(2): 99–100. https://doi.org/10.1303/jjaez.43.99

Johnson NF (1988) Species of Australian Telenominae (Hymenoptera: Scelionidae) of A. P. Dodd and A. A. Girault. Proceedings of the Entomological Society of Washington 90: 229–243.

Johnson NF (1992) Catalog of World Proctotrupoidea Excluding Platygastridae. Memoirs of the American Entomological Institute 51: 1–825.

Johnson NF (2019) Hymenoptera Online (HOL). http://hol.osu.edu/ [last accessed on 26/09/2019]

Kieffer JJ (1926) Scelionidae. Das Tierreich (Vol. 48). Walter de Gruyter and Co, Berlin, 885 pp.

Kikuchi A, Kuranouchi T (1985) Influence of host age and fertilization on development of alydid egg parasite *Gryon hakonensis* (Heteroptera). Proceedings of the Kanto-Tosan Plant Protection Society 32: 178–180. https://doi.org/10.11337/ktpps1954.1985.178

Kikuchi A, Naito A, Matsuura H (1986) Parasitic ability of egg parasitoid *Gryon hakonense* (Hymenoptera, Scelionidae). Proceedings of the Kanto-Tosan Plant Protection Society 33: 194–195. https://doi.org/10.11337/ktpps1954.1986.194

Kikuchi A, Naito A, Matsuura H (1995) Attempts to increase percent parasitism of three hymenopterous species on the egg of two soybean stink bugs by host eggs added artifically in open field. Bulletin of the National Agriculture Research Center 24: 61–66.

Kononova SV (1995) 25. Fam. Scelionidae. In: Lehr PA (Ed.) Key to insects of Russian Far East in six volume. vol. 4. Neuropteroidea, Mecoptera, Hymenoptera. Part 2. Dal'nauka, Vladivostok, 57–121.

Kononova SV, Fursov VN (2005) New species of egg-parasitoids of the family Scelionidae (Hymenoptera, Proctotrupoidea) from Japan. Zoologicheskii Zhurnal 84(5): 592–604.

Kononova SV, Kozlov MA (2008) Scelionids of the Palearctic (Hymenoptera, Scelionidae). Subfamily Scelioninae. Tovarishchestvo Nauchnykh Izdanii KMK, Saint Petersburg-Moscow, 489 pp.

Kononova SV, Petrov SD (2002) A review of the genera *Gryon* and *Exon* (Hymenoptera, Scelionidae) from the Palaearctic. 2. A key for identification of *Gryon* species and a review of the genus Exon. Zoologicheskii Zhurnal 81(1): 53–59.

Korenko S, Pekár S (2010) Is there intraguild predation between winter-active spiders (Araneae) on apple tree bark? Biological Control 54(3): 206–212. https://doi.org/10.1016/j.biocontrol.2010.05.008

Kozlov MA, Kononova SV (1989) New species of the genus *Gryon* Haliday (Hymenoptera, Scelionidae) of the USSR and neighbour countries. Trudy Zoologicheskogo Instituta Akademii Nauk SSSR 188: 78–100.

Kozlov MA, Kononova SV (1990) Scelioninae of the Fauna of the USSR (Hymenoptera, Scelionidae, Scelioninae). Nauka, Leningrad, 344 pp.

Krombein KV, Burks BD (1967) Hymenoptera of America north of Mexico. Synoptic Catalog (Agriculture Monograph No. 2) Second supplement. U.S. Government Printing Office, Washington, 584 pp.

Lê XH (2000) Egg-Parasites of Family Scelionidae (Hymenoptera). Fauna of Vietnam (Vol. 3). Science and Technics Publishing House, Hanoi, 386 pp.

Mani MS (1941) Serphoidea. Catalogue of Indian Insects 26: 1–60.

Mani MS, Sharma SK (1982) Proctotrupoidea (Hymenoptera) from India. A review. Oriental Insects 16(2): 135–258. https://doi.org/10.1080/00305316.1982.10434314

Masner L (1961) The genera *Gryon* Hal., *Idris* Foerst. and *Hemisius* Westw. (Hym., Scelionidae). Časopis Československé Společnosti Entomologické 58: 157–168.

Masner L (1965) The types of Proctotrupoidea (Hymenoptera) in the British Museum (Natural History) and in the Hope Department of Entomology, Oxford. Bulletin of the British Museum (Natural History) Entomology Supplement 1: 1–154.

Masner L (1975) Two new sibling species of *Gryon* Haliday (Hymenoptera, Scelionidae), egg parasites of blood-sucking Reduviidae (Heteroptera). Bulletin of Entomological Research 65: 209–213. https://doi.org/10.1017/S0007485300005915

Masner L (1979) The *variicornis*–group of *Gryon* Haliday (Hymenoptera: Scelionidae). Canadian Entomologist 111: 791–805. https://doi.org/10.4039/Ent111791-7

Masner L (1980) Key to genera of Scelionidae of the Holarctic region, with descriptions of new genera and species (Hymenoptera: Proctotrupoidea). Memoirs of the Entomological Society of Canada 113: 1–54. https://doi.org/10.4039/entm112113fv

Masner L (1983) A revision of *Gryon* Haliday in North America (Hymenoptera: Proctotrupoidea: Scelionidae). Canadian Entomologist 115: 123–174. https://doi.org/10.4039/Ent115123-2

Masner L, Muesebeck CFW (1968) The types of Proctotrupoidea (Hymenoptera) in the United States National Museum. Bulletin of the United States National Museum 270: 1–143. https://doi.org/10.5479/si.03629236.270

Mikó I, Masner L, Deans AR (2010) World revision of *Xenomerus* Walker (Hymenoptera: Platygastroidea, Platygastridae). Zootaxa 2708: 1–73. https://doi.org/10.11646/zootaxa.2708.1.1

Mikó I, Vilhelmsen L, Johnson NF, Masner L, Pénzes Z (2007) Skeletomusculature of Scelionidae (Hymenoptera: Platygastroidea): Head and Mesosoma. Zootaxa 1571: 1–78. https://doi.org/10.11646/zootaxa.1571.1.1

Mineo G (1979) Studies of the Scelionidae (Hym. Proctotrupoidea). IX. Material for a revision of the genus *Gryon* Hal., with description of 4 new species (*G. austrafricanum*, *G. eremiogryon*, *G. laraichii*, *G. nicolai*) and notes on other scelionids. Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri" Portici 36: 234–265.

M*ineo* G (1980a) Studi sugli Scelionidae (Hym. Proctotrupoidea). X. Materiale per una revi*sione del genere G*ryon Haliday: osservazioni su specie note, nuove sinonimie e descrizione del maschio di Gryon dichropterus Kozlov. Bollettino dell'Istituto di Entomologia Agraria e dell'Osservatorio di Fitopatologia di Palermo 10: 189–203.

Mineo G (1980b) Studies on the Scelionidae (Hym. Proctotrupoidea). XI. A revision of the Palearctic species of *Gryon* Haliday: the *insulare* and *pubescens* groups. Bollettino dell'Istituto di Entomologia Agraria e dell'Osservatorio di Fitopatologia di Palermo 10: 213–226.

Mineo G (1981) Studies on the Scelionidae (Hym. Proctotrupoidea) XIII. A revision of the Palearctic species of *Gryon* Haliday: the *muscaeformis* group. Redia 64: 117–147.

Mineo G (1983a) Studies on the Scelionidae (Hym. Proctotrupoidea) XVIII. Revision of the genus *Gryon* Hal. (Ethiopian-Oriental regions): the *charon*-group. Phytophaga 1: 11–26.

Mineo G (1983b) Studies on the Scelionidae (Hym. Proctotrupoidea) XX. Revision of the genus *Gryon* Haliday (Ethiopian region): the *insulare* and *oculatum*-groups. Redia 66: 527–552.

Mineo G (1990a) Studies on the Scelionidae (Hym. Proctotrupoidea) XXV. Material for a revision of *Gryon* Haliday with description of six new species: *Gryon crassifemoratum*, *G. gryonis*, *G. minimum*, *G. pecki*, *G. scorsonis* and *G. sulawense*. Frustula Entomologica Nouvelles Séries 11: 171–188.

Mineo G (1990b) Studies on the Scelionidae (Hym, Proctotrupoidea) XXVI. Material for a revision of *Gryon* Hal. with description of a new species: *Gryon risbeci*. Frustula Entomologica Nouvelles Séries 12: 47–59.

Mineo G (1991) Description of new species of *Gryon* Haliday (Hym., Scelionidae). Frustula Entomologica Nouvelles Séries 14: 1–42.

Mineo G, Caleca V (1987a) Remarks on the species of *Gryon* Haliday of the *floridanum*-group with description of a new species (Hym. Proctotrupoidea: Scelionidae). Phytophaga 2: 31–39.

Mineo G, Caleca V (1987b) Studies on the Scelionidae (Hym. Proctotrupoidea). XXIII. World revision of four small groups of *Gryon* Haliday: the *artum*, the *austrafricanum*, the *hospes* and the *misellum* (Hym., Proctotrupoidea, Scelionidae). Phytophaga 2: 41–56.

Mineo G, Villa L (1982) The morphology of the back of the head of Gryonini (Hym. Proctotrupoidea, Scelionidae). Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri" Portici 39: 133–162.

Nakajima Y, Fujisaki K (2010) Fitness trade-offs associated with oviposition strategy in the winter cherry bug, *Acanthocoris sordidus*. Entomologia Experimentalis et Applicata 137: 280–289. https://doi.org/10.1111/j.1570-7458.2010.01066.x

Nakajima Y, Nakagawa R, Fujisaki K (2012) Interactions between the winter cherry bug *Acanthocoris sordidus* (Hemiptera: Coreidae) and its egg parasitic wasps. Applied Entomology and Zoology 47: 35–44. https://doi.org/10.1007/s13355-011-0086-2

Nixon GEJ (1934) New Javanese Species of *Hadronotus* (Hym., Proct., Scelioninae). Stylops 3: 1–5. https://doi.org/10.1111/j.1365-3113.1934.tb01520.x

Noda T (1989) Seasonal occurrence of egg parasitoids of *Riptortus clavatus* (Thunberg) (Heteroptera: Alydidae) on several leguminous plants. Japanese Journal of Applied Entomology and Zoology 33(3): 257–259. https://doi.org/10.1303/jjaez.33.257

Noda T (1990a) Effects of ovipositional experience and length of intervals after previous parasitism on host discrimination in *Gryon japonicum* (Ashmead) (Hymenoptera: Scelionidae). Applied Entomology and Zoology 25(1): 130–132. https://doi.org/10.1303/aez.25.130

N*oda T (1990b)* Laboratory host range test of the parasitic wasp, Gryon japonicum (Ashmead) (Hymenoptera: Scelionidae). Japanese Journal of Applied Entomology and Zoology 34(3): 249–252. https://doi.*org/10.1303/jjaez.34.249*

Noda T (1993) Ovipositional strategy of Gryon japonicum (Hymenoptera: Scelionidae). Bulletin of the National Institute of Agro-Environmental Sciences 9: 1–51. http://agriknowledge.affrc.go.jp/RN/2010490441.pdf

Noda T, Hirose Y (1989) "Males se*cond" strategy in the allocation of sexes by the parasitic wasp, Gryon japonicum*. Oecologia 81(2): 145–148. https://doi.org/10.1007/BF00379797

Roversi PF, Strong WB, Caleca V, Maltese M, Sabbatini Peverieri G, Marianelli L, Marziali L, Strangi A (2011) Introduction into Italy of *Gryon pennsylvanicum* (Ashmead), an egg parasitoid of the alien invasive bug *Leptoglossus occidentalis* Heidemann. EPPO Bulletin 41(1): 72–75. https://doi.org/10.1111/j.1365-2338.2011.02439.x

Sharma SK (1982) On some Scelionidae (Proctotrupoidea: Hymenoptera) from India. Records of the Zoological Survey of India 79: 319–342.

Talamas EJ, Thompson J, Cutler A, Schoenberger SF, Cuminale A, Jung T, Johnson NF, Valerio AA, Smith AB, Haltermann V, Alvarez E, Schwantes C, Blewer C, Bodenreider C, Salzberg A (2017) An online photographic catalog of primary types of Platygastroidea (Hymenoptera) in the National Museum of Natural History, Smithsonian Institution. Journal of Hymenoptera Research 56: 187–224. https://doi.org/10.3897/jhr.56.10774

Talamas EJ, Pham H-T (2017) An online photographic catalog of Platygastroidea (Hymenoptera) in the Institute of Ecology and Biological Resources (Hanoi, Vietnam), with some taxonomic notes. Journal of Hymenoptera Research 56: 225–239. https://doi.org/10.3897/jhr.56.10214

Teraoka T, Numata H (1997) Occurrence of egg parasitoids of the bean bug, *Riptortus clavatus*, in legume fields. Proceedings of the Kansai Plant Protection Society 39: 21–22. https://doi.org/10.4165/kapps1958.39.0_21

Togashi, I, Hayashi, K, Yamashita Y (1988) Studies on the material of band-trap in pear or apple orchards in Ishikawa prefecture. Proseedings of the Association for Plant Protection of Hokuriku 36: 39–43. http://hokuriku-byochu.sakura.ne.jp/apph/files/articles/36/363943.pdf

Watanabe C (1951) On five scelionid egg-parasites of some pentatomid and coreid bugs from Shikoku, Japan (Hymenoptera: Proctotrupoidea). Transactions of the Shikoku Entomological Society 2: 17–26.

Yasuda K (1990) Ecology of the leaf footed plant bug, *Leptoglossus australis* Fabiricius (Heteroptera: Corediae), in the sub-tropical region of Japan. Tropical Agriculture Research Series 23: 229–238. https://www.jircas.go.jp/sites/default/files/publication/tars/tars23-_229-238.pdf

Yasuda K, Tsurumachi M (1995) Influence of male adults of the leaf-footed plant bug, *Leptoglossus australis* (Fabricius) (Heteroptera: Coreidae), on host-searching of the egg parasitoid, *Gryon pennsylvanicum* (Ashmead) (Hymenoptera: Scelionidae). Applied Entomology and Zoology 30(1): 139–144. https://doi.org/10.1303/aez.30.139

Yoshimura H, Kinoue M, Yano K (1995) Insect pests, insect natural enemies and spiders captured by the band traps on pine trees: an evaluation of band trap method. Japanese Journal of Entomology 63(4): 897–909. https://dl.ndl.go.jp/info:ndljp/pid/10654970

Zukeyama H, Sadoyama Y, Teruya T (2007) Life history of Paradasynus spinosus (Heteroptera: Coreidae) in Okinawa, Japan. Plant Protection 61(8): 430–434. http://jppa.or.jp/archive/pdf/61_08_24.pdf

Appendix 1

Checklist of Japanese Gryon with its host records.

Species group and species	Host species	Reference
charon–group		
G. philippinense	*Acanthocoris sordidus* (Thumberg)	Mineo 1990b
(= *G. hakonese* syn. nov.)	*Homoeocerus marginellus* (Herrich–Schäffer)	Nixon 1934
	Leptoglossus membranaceus (Fabricius)	Kieffer 1926
G. shisa sp. nov.	*Paradasynus spinosus*	The present study
floridanum–group		
G. pennsylvanicum	*Anasa tristis* (De Geer)	Masner 1983
	Narnia femorata Stål	Masner 1983
	Leptoglossus corculus (Say)	Masner 1983
	L. fulvicornis (Westwood)	Masner 1983
	L. gonagra (Fabricius) †	Yasuda 1990
	L. phyllopus (Linnaeus)	Masner 1983
	L. occidentalis Heidemann	Roversi et al. 2011
	Chelinidea sp.	Masner 1983
insulare–group		
G. hidakae	Unknown	–
G. insulare	Unknown	–
G. janus	Unknown	–
G. viggianii	Unknown	–
misellum–group		
G. misellum	Unknown	–
muscaeforme–group		
G. ruficoxa sp. nov.	Unknown	–
G. japonicum	*Acanthocoris sordidus* (Thumberg)	Mineo 1990a
(= *G. misha* syn. nov.)	*Cletus trigonus* (Thumberg)	Mineo 1990a
(= *G. orestes*) ‡	*C. schmidti* Kiritshenko §	Noda 1990b
	C. punctiger (Dallas) §	Noda 1990b
	Leptocorisa chinensis (Dallas)	Noda 1990b
	Riptortus pedestris (Linnaeus) ¶	Noda 1989
G. yamagishii	Unknown	–
(= *G. marruzzae* syn. nov.)		
(= *G. sugonjaevi* syn. nov.)		
myrmecophilum–group		
G. remotum	Unknown	–
pubescens–group		
G. nigricorne	*Riptortus pedestris* (Linnaeus) ¶	Higuchi et al. 1999
	R. linearis (Fabricius)	Noda 1989 #
Incertae sedis		
G. ennius	Unknown	–
G. excertum	Unknown	–
G. marina	Unknown	–
G. tardum	Unknown	–

† as *L. australis* (Fabricius). ‡ record based on misidentification. § result of sentinel egg tests in the field. ¶ as *R. clavatus* (Thumberg). # as *Gryon* sp.